2014

SPOKANE INTERNATIONAL AIRPORT MASTER PLAN

Mead & Hunt

SPOKANE INTERNATIONAL AIRPORT

MASTER PLAN

MARCH 17, 2014

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Appendix A Real Estate Revenue Enhancement

Exhibit 1 – Aeronautical/Non Aeronautical Property

Exhibit 2 – Selected Reference Documents

Appendix B Copy of Approved Airport Layout Plan (ALP) Set

CHAPTER 1

INVENTORY

1.0 INTRODUCTION

The Spokane International Airport (GEG or "the Airport") is the second busiest airport in the State of Washington in terms of passenger and cargo service. GEG is designated as a primary commercial service airport by the Federal Aviation Administration (FAA) because more than .05% of the total U.S. passengers board flights at the Airport. In addition to the many buildings and systems in place to support the passenger and cargo service, airport facilities support general aviation, and military activity. The Airport manages a nearby business and industrial park which supports airport-compatible development. Fairchild Air Force Base (FAFB), home of the 92nd Air Refueling Wing, is located four miles to the west.

This chapter will provide an overview of existing activities, facilities and infrastructure at the Airport, beginning with a community profile, and a description of the Airport's role in the community as a provider of aviation services. The inventory includes on-airport features such as airfield facilities, the terminal building, ancillary facilities, and the business park. Inventory also includes an overview of regional circulation, environmental factors, existing utilities, and surrounding airspace.

1.1 COMMUNITY PROFILE

The Airport is an integral part of the transportation infrastructure and economy in the Inland Northwest, a geographic area including Washington State east of the Cascades mountain range and Idaho north of the Salmon River. This section describes the community and the region surrounding the Airport.

1.1.1 Location and Setting

The Airport is located in Spokane County, the largest metropolitan area in the Inland Northwest. The Airport is located southwest of downtown the City of Spokane and southeast of the City of Airway Heights. The Spokane River, one of the many natural attractions in the region, flows through the middle of the City of Spokane. A location map of the Airport and surrounding area is illustrated in **Figure 1-1**.

Completion of the Northern Pacific Railway in 1881 established the community of Spokane as a development hub for the region. Today, Spokane is served by a network of federal and state highways including Interstate 90. Interstate 90 is passes along the south side of the Airport, continuing west to Seattle and east through the City of Spokane.

Seattle is 280 miles to the west of the Airport; Portland, Oregon is 344 miles to the southwest; Boise, Idaho is 428 miles to the south; and Vancouver, British Columbia is 409 miles to the northwest. Airport location is described by the airport reference point (ARP), which is the latitude and longitude of the geometric center of the Airport's runways. The ARP at GEG is 47° 37' 8.5'' N / 117° 32' 6.8'' W.

Spokane and the surrounding region are home to many businesses that rely on the Airport to move people and freight. **Table 1-1** provides a regional overview.

1.1.2 Climate

Spokane is part of the large inland basin between the Cascade and Rocky Mountains. The area enjoys four distinct seasons with warm, sunny summers and cold, cloudy winters. July is the warmest month of the year with and average high of 83°F and an average low of 56°F. January is the coldest month of the year with an average high of 31°F and an average low of 20°F.

The prevailing direction of the wind is from the southwest and west for most of the year. Monthly wind speeds average between 9 and 10 miles per hour and the ten year annual average wind speed at GEG is 9.4 mph. Winds occasionally originate out of the northeast during winter months.

Spokane is on the "sunny side" of Washington State, and regularly records over 260 clear days each year during the Spring, Summer, and Fall. Winter months from November to February average more than 20 cloudy days per month, and foggy conditions are reported more than nine days per month. Spokane averages 16 to 22 inches of precipitation annually, and receives an average of 50 inches of snow during the year.

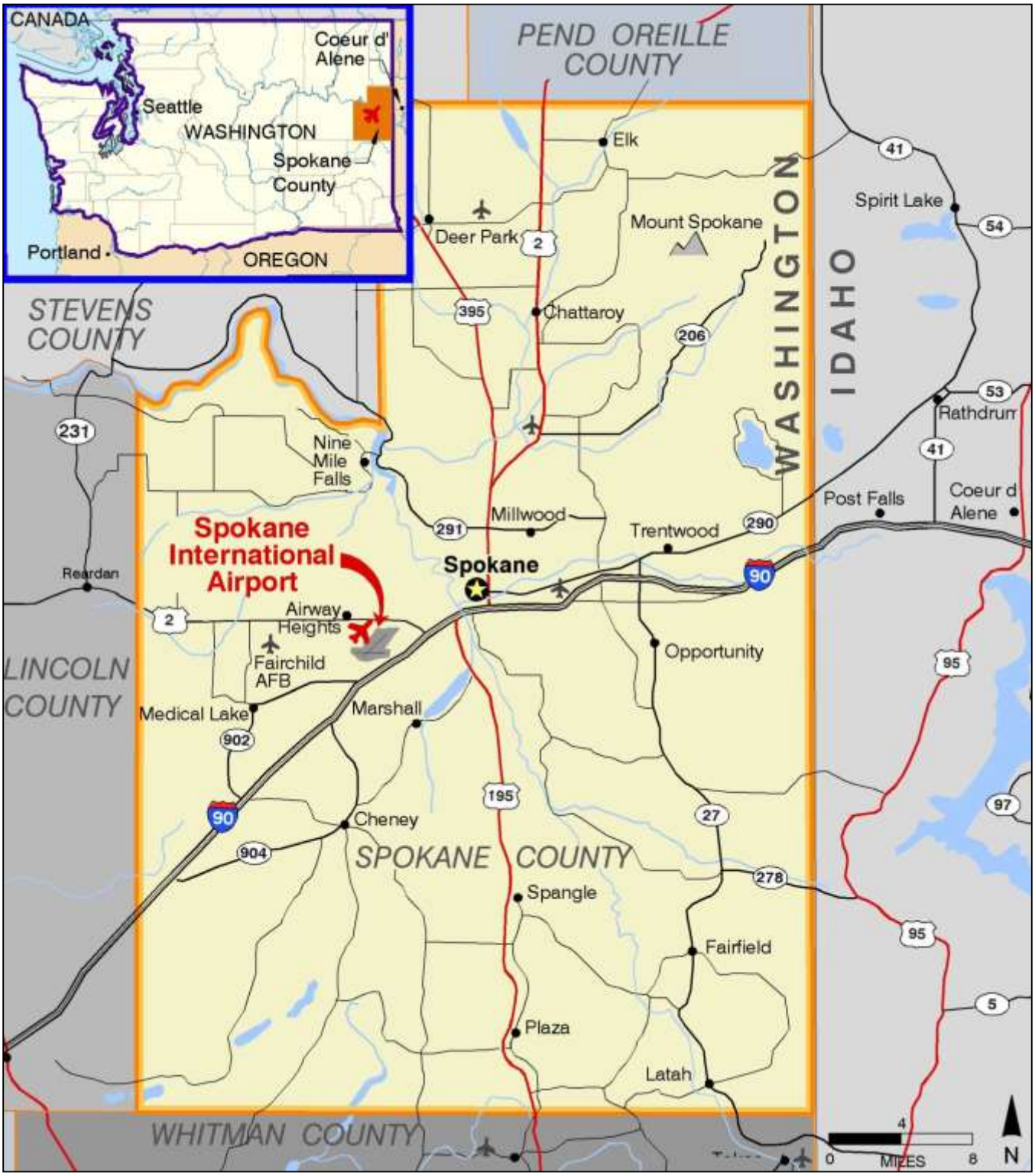


Figure 1-1

Location Map

Spokane International Airport

Table 1-1. Regional Overview

Geography

Location

- Spokane County is located in Eastern Washington
- Spokane County is part of the Inland Northwest region
- Spokane County total land area: 1,764 square miles
- 19 miles from the Idaho border
- 110 miles south of the Canadian border
- 280 miles east of Seattle
- 351 northeast of Portland

Topography

- Airport elevation: 2,385 ft. MSL
- Terrain in Spokane County varies from 1,879 to 2,400 ft

Surface Transportation

Major Highways

- Highways through Spokane:
  - Interstate 90 (I-90): E/W through Spokane, four-lane divided
  - US-395: N/S from Canada, two-lane
  - US-195: N/S to Lewiston, ID, two-lane
  - US-2: E/W west of Spokane, four-lane from I-90 to airport, 2-lane west of airport

Public Transportation

- Spokane Transit Authority (STA):
  - Service to Spokane County
  - Routes serving GEG and Spokane Station
  - Vanpool program
- Spokane Airport Shuttle Service
  - Daily shuttle service serving Washington, Idaho, Montana and Canada
- Private taxi and limousine services

Railways

- Freight Rail
  - Burlington Northern Santa Fe
  - Union Pacific/Southern Pacific
- Passenger Rail
  - Amtrak daily Empire Builder to Seattle, Portland, Chicago

Source: Western Regional Climate Center and Spokane County Comprehensive Plan

Population and Economy

Historical/Current Population (in thousands)

	1990	2000	2010
• City of Spokane	177	196	209
• Airway Heights	1.97	4.5	6.1
• Spokane County	361	418	471
• Service Area	502	584	650*
• Washington State	4,867	5,894	6,725

(Source: Office of Financial Management, State of Washington)

(Service Area: Spokane, Pend Orielle, Whitman, Lincoln, Adams, Okanagon, Stevens, and Ferry Counties in WA)

**estimated*

Projected Population

	2010	2020	2030
• Spokane County	46,6724	529,451	589,623

(Source: Office of Financial management, State of Washington)

Basis of Economy

- Spokane County's major employment sectors include education, medical services, information technology, digital media, manufacturing and aerospace
- 2010 Industry groups with greatest percentage of employment in Spokane County:
  - Government including education 17.6%
  - Healthcare and Social Assistance 16.8%
  - Retail 12.1%
  - Manufacturing 7.0%

(Source: Washington State Employment Security Department: Labor Market)

Climate

Temperature

	Avg. High	Avg. Low
• Hottest month (July)	83°F	56°F
• Coldest month (January)	31°F	20°F

Precipitation and Fog

- Average annual rainfall in Spokane County varies from 16-22 inches and also receives 50 inches of snow annually, mostly from November through February
- Fog occurs an average of 48 days per year with 37 days from November through February

Winds

- Prevailing winds from the southwest or west
- Annual average wind speed is 9.4 mph

Source: Western Regional Climate Center and Spokane County Comprehensive Plan

1.1.3 Socioeconomic Conditions

The U.S. Census reports the 2010 population of Spokane County to be 471,221 and the population of the City of Spokane to be 208,916, making Spokane the second most populous city in Washington after Seattle and ahead of Tacoma. The 2010 population of Airway Heights was 6,114 – a 36% increase from 2000. Continued population growth in the region is projected through 2030. Forecasts prepared by The State of Washington's Office of Financial Management (OFM) show that Spokane County's population will reach 561,627 by 2025. The Airway Heights/West Plains area is projected to experience continued residential growth over the next several decades. It is expected FAFB will no longer provide on-base housing in the future, shifting approximately 1,000 housing units into nearby communities.

The region's growing economy is a driving factor in residential and Airport growth. In spite of the national economic recession of the past several years, Spokane has a growing economic base in industries including education, medical services manufacturing, and aerospace. Employment in Spokane County is projected to increase by 90,000 employees by 2030, exceeding 339,000 employees. Employment at FAFB is projected to increase by 2,000 jobs during that time. Airway Heights/West Plains is also expecting employment gains.

1.1.4 Area Land Use

Land use in the vicinity of the Airport includes residential, industrial, commercial, agricultural and open space, as shown in **Figure 1-2.** A more detailed exploration of land use compatibility, including current and future land uses and regional planning initiatives, is provided in the Land Use Compatibility chapter.

Land use planning around airports addresses several fundamental compatibility issues including safety, noise and operational expansion. The proximity of FAFB to the Airport adds a layer of complexity to local land use planning. Coordinated planning efforts and ongoing communications are essential to meeting the stakeholders land use planning goals.

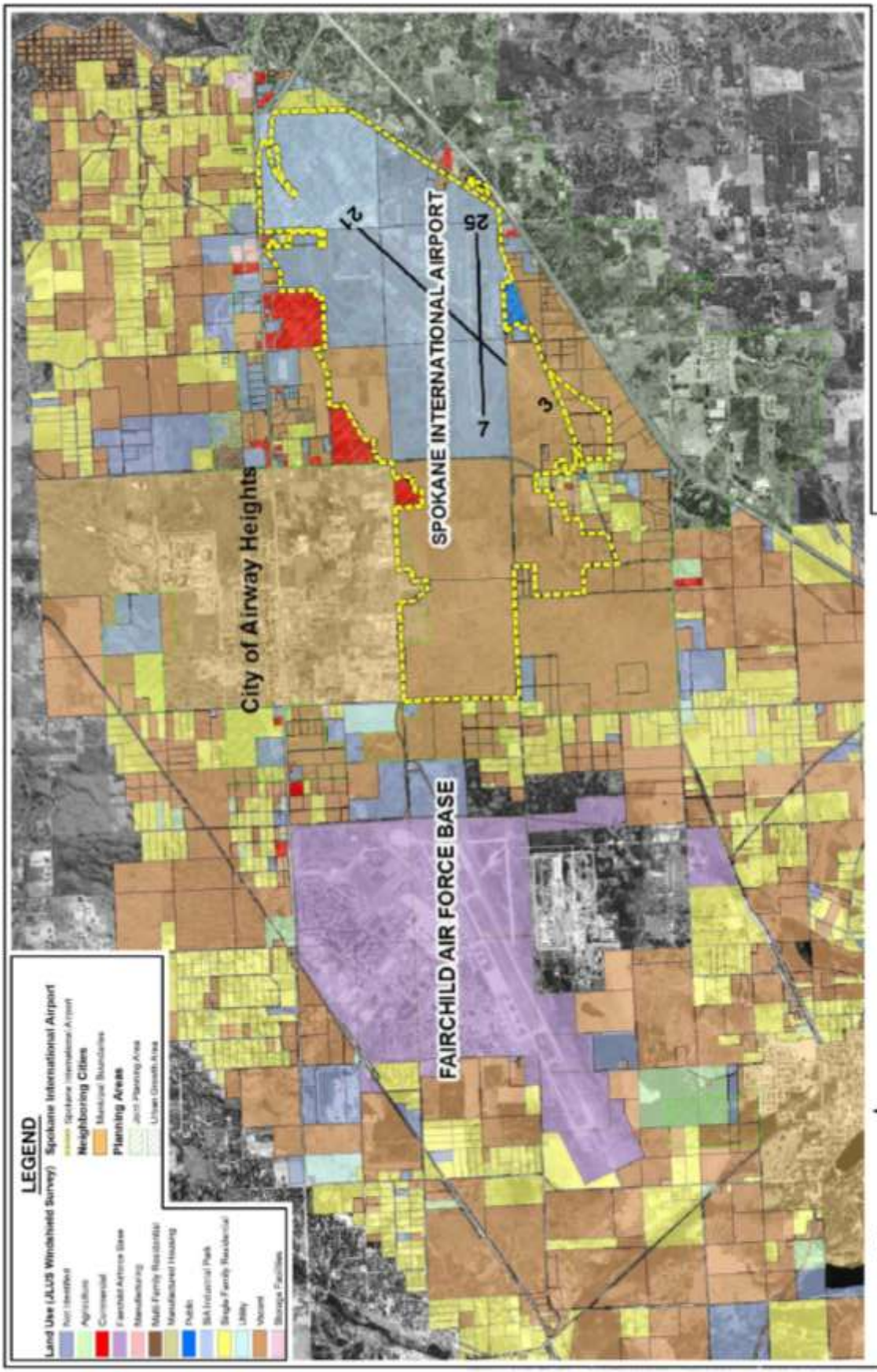


Figure 1-2

Area Land Use Map

Spokane International Airport

1.2 THE AIRPORT'S ROLE

Spokane International Airport is the largest passenger and air cargo airport in the Inland Northwest. The Airport is categorized as a primary commercial service airport by the FAA National Plan of Integrated Airport Systems (NPIAS). GEG is one of twelve airports in Washington categorized as primary commercial service out of the 67 Washington airports in the NPIAS. The NPIAS expands on the commercial service classification with the sub-classification of large hub, medium hub, small hub, and non-hub. In Washington, Seattle-Tacoma International Airport (SEA) is classified as a large hub, and GEG is a small hub. The remaining ten airports are classified as non-hub.

The Washington Aviation System Plan of 2003 (2003 System Plan) classifies GEG as a primary airport with regard to commercial service. Annual passenger enplanements at SEA represent 85 percent of annual passenger enplanements in Washington, and annual passenger enplanements at GEG represent nine percent. The 2003 System Plan indicates that 15 percent of Washington's air cargo tonnage passes through GEG, with 93,424 tons reported in 2005. In 2009, the U.S. Department of Transportation Bureau of Transportation Statistics reported 40,000 tons of inbound freight and 30,000 tons of outbound freight at GEG.

There are 579 based aircraft in stored at the five airports in the Spokane area, and 67 are based at GEG. Felts Field, which also owned and operated by the Spokane Airports Board, has 345 based aircraft. Crosswinds Airport, Deer Park Municipal Airport, and Mead Flying Service are also in the Spokane area.

The Airport is an integral part of the regional transportation network and economic structure. The Airport provides convenient air service for business and recreational travel. GEG also facilitates the transport of goods, materials and supplies in and out of the region and its tenant are employers and purchasers of supplies and services from local businesses. The Airport is an economic engine for development, bringing new businesses to the region. The Airport supports the following activates.

- Scheduled passenger service
- Cargo service (includes FedEx, UPS, USPS)
- A point of air access for the community
- Business and corporate aviation
- Recreational aviation
- Flight instruction
- Air ambulance (such as organ donors and critical care)
- Law enforcement
- Emergency service response (lifeline in case of natural or other disasters)
- Military operations
- A place to conduct business

The future role of the Airport is not expected to change. Roles are expected to expand over time to support population and economic growth in the region.

1.2.1 Airport Ownership and Management

The City and County of Spokane jointly own Spokane International Airport, Felts Field Airport, and the Airport Business Park (Spokane Airports). The operating authority of Spokane Airports is the Spokane Airport Board, consisting of seven appointees from the two governmental bodies. The airports and business park are funded using airport-generated revenue and grants, and do not receive funding from public tax dollars.

1.2.2 Spokane's Aviation History

Aviation activity began in Spokane in 1913 at Felts Field. Commercial air service moved from Felts Field to GEG in 1946, and the Airport was renamed from Geiger Field to Spokane International Airport in 1960.

Aviation activity began at FAFB in 1924 when Spokane raised 10,000 dollars in response to a friendly competition proposed by the National Guard's Adjutant General and became the location of the 116th Observation Squadron. In 1942, the War Department chose Spokane for the Army Air Depot because it found that the Cascade Mountain range provided a natural barrier against attack, and because citizens purchased 1,400 acres of land and presented the title to the War Department. Spokane's aviation history is described in **Table 1-2**.

Felts Field in 1927

Table 1-2. Spokane Aviation Timeline

1913	Aviation activities began at Felts Field.
1920	The field, then called the Parkwater airstrip, was designated a municipal flying field at the instigation of the Spokane Chamber of Commerce.
1926	The United States Department of Commerce officially recognized Parkwater as an airport, one of the first in the West.
1927	Parkwater Airfield renamed Felts Field in honor of Lt. Buell Feltz, who was killed in a plane crash there May 29, 1927.
1929	Aviation milestone by pilots Nick Mamer and Art Walker, who flew their single-engine Sun-God airplane from Spokane to New York via San Francisco and returned to Spokane without stopping on the five-day run.
1930	Daily air passenger service between Spokane and Seattle begins. Fliers make the flight from Felts Field in a tri-motored Ford plane.
1937	A survey was conducted to determine the location for a larger, more modern airport.
1939	The city agreed to lease what is now GEG to the military for one dollar a year, banning civilian use. The Works Progress Administration and the army jointly prepared the runways at Sunset Field.
1941	The Department of the Defense purchased Sunset Field from Spokane County for World War II B-17 and C-47 training facility.
1942	The War Department begins construction of the Spokane Army Air Depot, now FAFB.
1943	Sunset Field is renamed Geiger (GEG) Field in honor of Major Harold C. Geiger, a pioneer in Army aviation and ballooning. The Army Air Depot begins operations.
1946	A portion of the airfield was designated a municipal airport, and commercial airline operations were moved from Felts Field to Geiger Field.
1947	The 92nd and 98th Bomb Groups arrive at FAFB.
1960	Geiger Field was renamed Spokane International Airport.
1961	The first scheduled passenger jet from Spokane's new terminal lifts off in August bound for Minneapolis, MN, and Washington, D.C.
1961	At FAFB, the 92nd became the first "aerospace" wing in the nation with the acquisition of the Atlas intercontinental ballistic missile.
1974	Over five million people from around the world visited Riverfront Park in Spokane for "Expo '74" the first environmentally themed World's Fair. Many travelled through Spokane International Airport.
1974	The Air Force moves the Air National Guard 141st from GEG to Fairchild.
1993	FAFB begins its transition to an air refueling wing.
2009	Associated Painters and the consolidated rental car facility opened.
2010	Runway 3/21 extended from 9,000 to 11,000 feet.

Source: Mead & Hunt

1.2.3 Airport Activities

GEG serves scheduled and charter commercial passenger airlines, scheduled and charter commercial freight airlines, military users, and general aviation. The Airport offers non-stop service to destinations across the Western, Midwestern, and Central United States, and onward connections to the rest of the country and the world. The Airport is served by the following scheduled commercial airlines.

- Alaska Airlines
- Delta Airlines / Delta Connection
- Frontier Airlines
- Southwest Airlines
- United Airlines / United Express
- U.S. Airways

1.2.4 The Airport's Service Area

The extent of the Airport's service area, the area from which it draws users, varies by user type. General aviation and military users have more options within the region than scheduled commercial airlines. The service area for scheduled commercial airline service is known as the catchment area. Other airports in the region do not have passenger terminals or associated facilities. As a result, the catchment area includes eastern Washington, northern Idaho, western Montana, and southern British Columbia, Canada. The service area for corporate and business users is large on account of GEG's runway length, instrument approach procedures, and proximity to population centers. For light general aviation, the service area is smaller as a result of competition from smaller airports such as Felts Field that are specifically tailored to general aviation users.

1.3 AIRFIELD FACILITIES

Airfield facilities include runways, taxiways, and ancillary facilities designed to support aircraft operations. Airfield facilities are shown in **Figure 1-3** and described in **Table 1-3**.

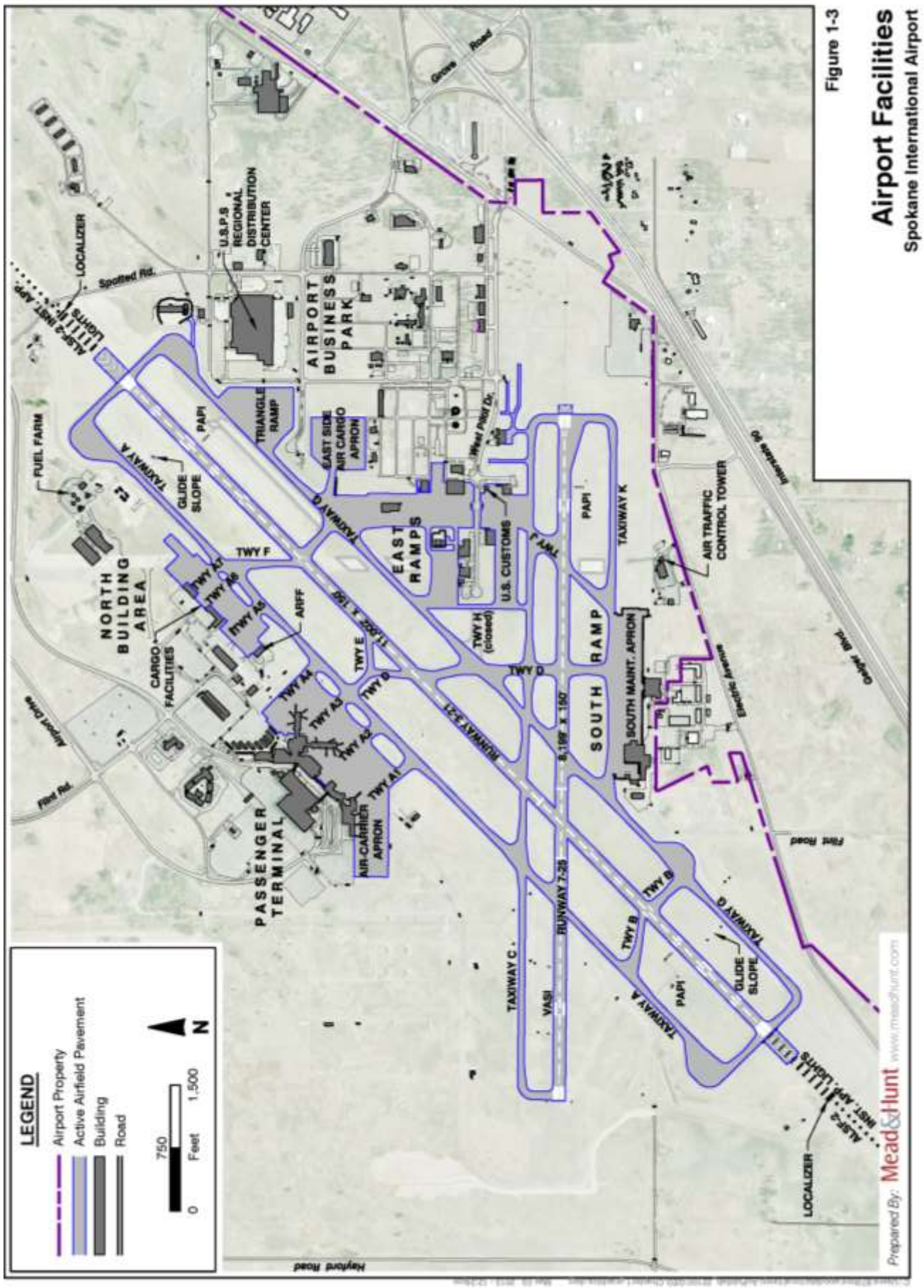

Airport Facilities
Spokane International Airport
Figure 1-3
LEGEND
Airport Property
Active Airfield Pavement
Building
Road
0
750
1,500
Feet
N
NORTH BUILDING AREA
CARGO FACILITIES
PASSENGER TERMINAL
AIR-CARRIER APRON
EAST RAMPS
AIRPORT BUSINESS PARK
U.S.P.S. REGIONAL DISTRIBUTION CENTER
EAST SIDE AIR CARGO APRON
TRIANGLE RAMP
SOUTH RAMP
SOUTH MAINT. APRON
AIR TRAFFIC CONTROL TOWER
U.S. CUSTOMS
FUEL FARM
ARFF
RUNWAY 3-21
8,196' x 150'
RUNWAY 7-25
11,002' x 150'
TAXIWAY A
TAXIWAY B
TAXIWAY C
TAXIWAY D
TAXIWAY K
TWY A1
TWY A2
TWY A3
TWY A4
TWY A5
TWY A6
TWY A7
TWY B
TWY D
TWY E
TWY F
TWY H (closed)
PAPI
GLIDE SLOPE
VASI
LOCALIZER
ALSF-2 INST. APP. LIGHTS
Spotted Rd.
Grove Road
Westbound 90
Eastbound 90
Electric Avenue
Flint Road
Hayford Road
Airport Drive
West Pkwy Dr.
Prepared By: Mead&Hunt www.meadhunt.com

Table 1-3. Airport Features

GENERAL INFORMATION

- *Airport Ownership:* Joint ownership, City and County of Spokane
- *Property Size:*
  - Fee simple: 4,914 acres
- *Airport Classification:* Commercial Service, Primary, Small-Hub
- *Airport Elevation*: 2,385 ft. MSL
- *ATCT hours of operation:* 6:00 a.m. - 10:00 p.m.

RUNWAY/TAXIWAY DESIGN

Runway 3/21

- *Airport Reference Code:* D-IV
- *Critical Aircraft:* Boeing 767-300
- *Dimensions:* 11,002 ft. long, 150 ft. wide
- *Pavement Strength (main landing gear configuration)*
  - 200,000 lbs. (single wheel)
  - 200,000 lbs. (dual wheel)
  - 400,000 lbs. (dual-tandem wheel)
- *Average Gradient: 0.57% (rising to the southwest)*
- *Runway Lighting:* High intensity runway edge lights, centerline, touchdown points
- *Approach Aids:*
  - Rwy. 3: ALSF2 (High Intensity Approach Lighting System with Sequenced Flashing Lights), Localizer, RVR, 4-light Precision Approach Path Indicator (PAPI), 3.0° glide angle
  - Rwy. 21: ALSF2, Localizer, RVR, 4-light PAPI, 3.0° glide angle
- *Runway Markings:* Precision
- *Primary Taxiways:* Full-length parallel Taxiway A on west side and full-length parallel Taxiway G on east

Runway 7/25

- *Airport Reference Code:* C-III
- *Critical Aircraft:* Boeing 737-500 / Bombardier Q400
- *Dimensions*: 8,199 ft. long, 150 ft. wide
- *Pavement Strength* (main landing gear configuration)
  - 150,000 lbs. (single wheel)
  - 180,000 lbs. (dual wheel)
  - 280,000 lbs. (dual-tandem wheel)
- *Average Gradient:* 0.05% (rising to the west)
- *Runway Lighting:* Medium intensity runway lights,
- *Approach Aids*
  - Rwy. 7: 4-light Visual Approach Slope Indicator (VASI), runway end identifier lights (REIL)
  - Rwy. 25: 4-light PAPI, 3.0° glide angle, REILs
- *Runway Markings*: Non-precision
- *Primary Taxiways:* Full-length parallel Taxiway C north side

MANAGEMENT AND SERVICES

Management

- Operational authority granted by the Spokane Airport Board
- On-Airport management and staff

Facilities / Services

- *Scheduled passenger service*
- *Cargo:* UPS and FedEx
- *U.S. Customs:* U.S. port-of-entry for private charter aircraft from Canada
- *Fuel service*: Jet A, 100LL and 100
- *Airport Rescue and Firefighting:* Index B
- Airfreight, avionics, cargo, charter, flight instruction, parachute jumping, aircraft rental and sales
- *Airport Visual Approach Aids*: Beacon, lighted wind indicator

BUILDING AREAS

- *Passenger Terminal*: Passenger terminal and cargo facilities located on north side of Airport
  - Passenger gates: 24
  - Remain overnight parking: 20 at terminal and 3 dedicated spaces
- *North Building Area*: Fuel, terminal support, and cargo facilities located north of passenger terminal
- *East Ramps*: General aviation facilities, FBOs, flight school, U.S. Customs
- *South Ramp:* Maintenance and repair facilities

TRAFFIC PATTERNS AND APPROACH PROCEDURES

Airplane Traffic Patterns

- *Determined by ATCT*
- *Runways 3/21 and 7*: Right traffic
- *Runway 25*: Left traffic

Instrument Approach Procedures (lowest minimums)

- *Runway 3*: Category III
  - Straight-in: Decision altitude: 0 ft. above TDZE
- *Runway 21:* Category III
  - Straight-in: Decision altitude: 0 ft. above TDZE
- *Runway 7:* GPS LPV
  - Straight-in: (¾ mi. visibility, 200 ft. AGL decision altitude)
  - Circling: (1 mi. vis., 600 ft. AGL decision alt.)
- *Runway 25:* GPS LPV
  - Straight-in: (1 mi. visibility, 400 ft. AGL decision alt.)
  - Circling: (1 mi. vis., 600 ft. AGL descent alt.)

Source: Mead & Hunt (April 2013)

1.3.1 Airport Layout

The Airport is located on 4,906 acres, and includes two runways, a passenger terminal building, airside and landside development areas, parking facilities and access points. GEG's two runways, Runway 3/21 and Runway 7/25, intersect on the south end of the Airport.

The primary building areas are located north of Runway 7/25, on both sides of Runway 3/21. Facilities in these areas include aircraft parking aprons, cargo and passenger terminal buildings, hangars, the aircraft rescue and firefighting (ARFF) station, and automobile parking. The area south of Runway 7/25includes a variety of aviation related business activities including corporate hangars and an aircraft painting facility. The Airport Business Park is located on the east side of the airfield.

The Airport is generally bound by surface roads. Geiger Boulevard is to the east; Electric Avenue is to the south; McFerron and Craig Roads are to the west; and McFarland Road and U.S. Highway 2 are to the north. Airport Drive is the primary route to and from the passenger terminal facilities and the primary access to the Airport's Business Park area is provided by Flightline Boulevard.

1.3.2 Runway 3/21

Runway 3/21 is the primary runway at GEG, and is 11,002 feet long and 150 feet wide. Runway 3/21 is constructed of asphalt over concrete except for the southern 2,002 feet which is concrete. The pavement strength for Runway 3/21 is:

- 200,000 pounds for single- and dual-wheel gear
- 400,000 pounds for aircraft with dual-tandem gear.

Each end of Runway 3/21 is equipped with an Instrument Landing System (ILS) capable of Category III approaches. ILS is referred to a precision approach system, offering vertical and horizontal guidance for specially equipped aircraft. The ILS approaches allow the Airport to remain operational during most weather conditions. Additional visual aids include 4-light Precision Approach Path Indicators (PAPIs) assist pilots staying on the glide path as they approach Runways Ends 3 and 21.

Runway 3/21 has high intensity edge lighting and in-pavement centerline lights, and both runway ends have touchdown zone lights. The Runway End 21 approach lighting system with sequenced flashing lights (ALSF-2) may be operated as a Simplified Short Approach Lighting System with Runway Alignment Indicator Lights (SSLAR) when visibility conditions do not require the full ALSF-2.

1.3.3 Runway 7/25

Runway 7/25 is the secondary runway, and gives aircraft operators and air traffic controllers increased flexibility, and provides crosswind protection for smaller aircraft. Runway 7/25 is 8,199 feet long and 150 feet wide. Runway 7/25 is made of asphalt over concrete and has the following pavement strengths:

- 150,000 pounds for single-wheel gear.
- 180,000 pounds for dual-wheel gear.
- 280,000 pounds for aircraft with dual-tandem gear.

Runway 7/25 is outfitted with medium intensity runway edge lights (MIRL) the length of the runway, and runway end identifier lights (REILs) at each end. A 4-box visual approach slope indicator (VASI) lights are located at Runway End 7, and a 4-light PAPI is located at Runway End 25.

1.3.4 Taxiways

The taxiway system consists of eight main taxiways and additional connector taxiways, shown in **Figure 1-3**. Each taxiway is defined as a movement area, and is under the control of the airport traffic control tower (ATCT). Primary taxiways include Taxiways A and G, which run parallel to Runway 3/21. Taxiway A serves the west side of the runway including the passenger terminal and cargo area. Taxiway G provides access to the east side general aviation areas. Taxiway C runs parallel to Runway 7/25 on the north side of the runway and also services the general aviation area.

1.3.5 Runway Setbacks and Protections

The FAA has established a variety of setbacks and clearance standards to enhance airfield safety efficiency. Primary airfield setbacks are described below.

Entirely on-airport:

- Safety Areas — Graded and drained surfaces surrounding runways and taxiways.
- Object Free Areas — Clear areas beyond the safety areas that provide wingtip clearance.
- Obstacle Free Zones — Clear airspace at the runways for transitioning aircraft between flight and ground operation.
- Electronic and transmitter critical areas —Clear areas that protect electronic signals from interference and distortion. These surround radio communications devices, navigational aids, weather aids, and visual aids.
- Runway Visibility Zone — Clear area that provides unobstructed line of sight between aircraft operating on intersecting runways.
- Aircraft Parking Limits— Setback distance from runway and taxiway movement areas.
- Building Restrictions — A setback established using the most restrictive composite set of clearing requirements for future building development.
- Controller line-of-sight — Clear view from the tower to all critical aircraft movement areas.

Extending off-airport:

- Runway Protection Zones (RPZ) — A trapezoidal-shaped area beyond the runway end with land use recommendations intended to enhance the protection of people and property on the ground.
- Airport Imaginary Surfaces— Surfaces defined by Code of Federal Regulations (C.F.R.) Title 14, Part 77 intended to identify obstacles in the vicinity of an airport and to establish notification requirements for any new construction.
- Runway End Clearances— A set of FAA design standards for establishing landing and takeoff threshold locations.
- Instrument Procedure Clearances—Obstacle clearances that determine the vertical separation between aircraft and ground obstacles along a specifically defined segment of airspace of a published instrument procedure.
- Air carrier protection surfaces— Surfaces defined by each individual air carrier operator used in determining the maximum takeoff weight.

The FAA recommends that airports own all of the property within the RPZ. GEG owns the majority of property within the established RPZ's for all four runway ends. The only area that the Airport does not own is located where the Geiger Boulevard right-of-way clips the southeast corner of the Runway End 25 RPZ.

RPZs begin 200 feet beyond the end of the runway. The RPZs at Runways Ends 3 and 21 are 2,500 feet long, with an inner width of 1,000 feet and an outer width of 1,750 feet. The RPZ for Runway End 7 is 1,700 feet long, with an inner width of 1,000 feet, and an outer width of 1,510 feet. The RPZ for Runway End 25 is 1,700 feet long, with an inner width of 500 feet, and an outer width of 1,010 feet.

1.3.6 Navigational and Weather Aids

Navigational aids at GEG include a white and green rotating beacon indicating a lighted land airport. Lighted wind indicators are present near the touchdown locations of each runway and an automated surface observing station (ASOS) provides pilots with current weather conditions at the Airport. A VOR (Very High Frequency Omni-directional Range beacon) is located five miles southwest of the Airport.

Runway visual range (RVR) sensors are used to accurately determine visibility at various points along the runway. RVR represents the distance a pilot can see on the ground in feet. Three RVR indicators are stationed on Runway 3/21, with one each at the touchdown, midfield and rollout points. The Airport also has an Airport Surveillance Radar (ASR) which is used to guide and separate air traffic in the vicinity of the Airport.

1.3.7 Airfield Lighting

An inventory of airport lighting is presented in **Table 1-3**. Runway 3/21 is equipped with ALSF-2, centerline sequence flashers and touchdown zone lights at each approach end. High intensity edge lights are installed the entire length of Runway 3/21. Runway 7/25 is equipped with medium intensity edge lights and runway end identifier lights at each end. Taxiways have blue taxiway edge lights. Taxiways A and G are equipped with green centerline lights. Taxiway entrances to Runway 3/21 and taxiway intersections with Runway 7/25 are equipped with runway guard lights. These features are shown on **Figure 1-4**.

1.3.8 Signage and Markings

Airfield signage is installed in accordance with AC 150/5340-18F, *Standards for Airport Sign Systems*. The following describes the basic signage and markings at the Airport:

Signage:

- Hold Position Signs – red signs with white inscriptions that indicate a hold position prior to a taxiway/runway or runway/runway intersection. Similar signs are used to identify the hold position for ILS critical areas, runway approach areas, and CAT II/III operations clear areas.
- Location Signs – yellow signs with black inscriptions that identify the taxiway or runway.
- Directional Signs – yellow signs with black inscriptions that identify taxiway name and direction with a letter and arrow.
  - Taxiway Direction Signs – indicate directions of other taxiways leading out of an intersection.
  - Runway Exit Signs – signs identifying taxiways serving as exits off of a runway
  - Destination Signs – specify the general direction of service facilities.
- Distance Remaining Signs – black signs with white numbers located along the side of runways indicating the runway distance remaining in increments of 1,000 feet.

Runway surface marking schemes are based on the most critical approach category for the runway.

- Runway 3/21 is marked with precision approach markings. These include the following.
  - Runway end designator –numbers that identify the magnetic heading of that runway.
  - Centerline – identifies the physical center of the runway and provides alignment guidance.
  - Threshold – establishes the actual beginning point of the threshold used for landings.
  - Aiming point – provides a visual aiming point for pilots during landing operations.
  - Touchdown zone – identifies the touchdown zone with symmetrically arranged pairs of rectangular bars.
  - Edge markings – define runway width for operations and provides contrast between runway edge and shoulders.
- Runway 7/25 is marked with non-precision approach markings that include the above, except touchdown zone markings.

- Taxiway surface markings:
  - Centerline marking – identifies the physical center of the taxiway and provides alignment guidance. Enhanced marking provides visual cues to alert of upcoming hold position.
  - Edge marking – defines taxiway width and provides contrast between taxiway edge and the infield.
- Enhanced runway hold position markings – surface painted sign that identifies a hold position on a taxiway or runway prior to intersecting an active runway. Similar markings are used to identify the hold position for ILS critical areas and precision obstacle free zones.
- Geographic position markings – pink spots painted on taxiways to enhance ground movement during low-visibility, used by pilots to confirm holding points or report location to ground control. The location and numbering used for geographic positions at GEG are illustrated in **Figure 1-4**.

1.4 AIRLINE PASSENGER TERMINAL FACILITIES

The terminal building supports the commercial activities of nine commercial airlines, two concessions providers and seven car rental companies. The terminal building includes three concourse areas (A, B and C) with a combined total of 25 gates—11 ground boarding and 14 with passenger boarding bridges (PBB). The A and B concourses together form a hub and spoke facility while the C concourse has a linear form. There is one ticketing counter, one baggage claim area, baggage screening, security checkpoints and a ground transportation area to serve concourses A and B and a second set to serve concourse C. The consolidated rental car facility is located at the north end of the terminal building. Two parking structures are connected to the terminal by skywalks. All of these facilities are located on the first floor. There is a second floor above the ticketing area with the airport administration offices and the second floor in the concourse areas is used for passenger holding and circulation. Basement areas are used primarily for mechanical and support spaces.

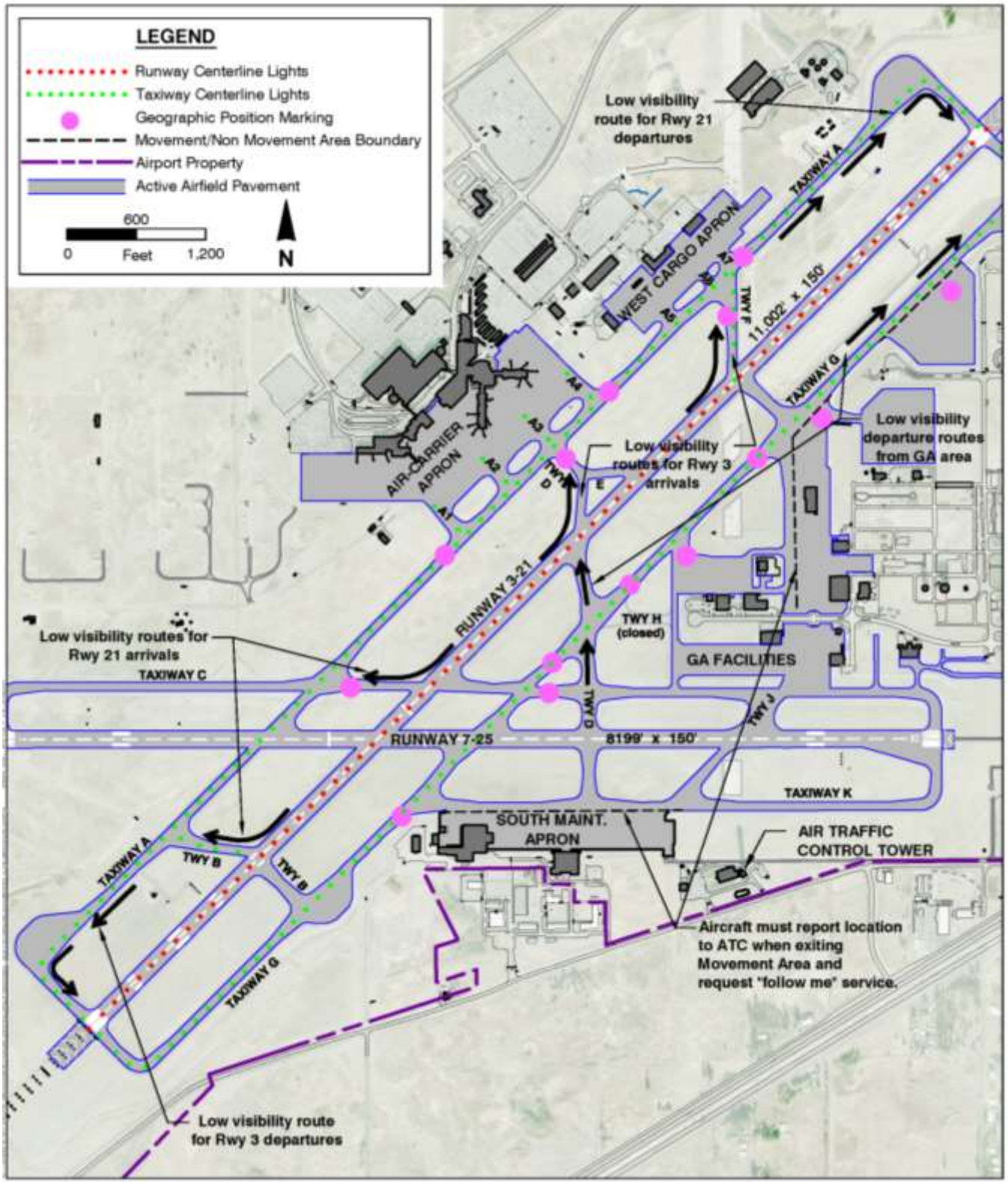


Figure 1-4

SMGCS System and Low Visibility Routes

Spokane International Airport

The terminal facility today is comprised primarily of 2 structures with connecting corridors. Because of the linear layout of the facility, there is a long walk between concourse C and concourse A/B where the rental car counters are located. In front of the building, there is ample covered and non-covered sidewalk at the drive aisle for passenger pick-up and drop-off. The non-secured circulation areas include ticketing, restrooms, visitor seating and concession stands (see **Figure 1-5**).

The A and B concourses have both ground boarding and passenger boarding bridge gates. The A/B checkpoint and rotunda floors are elevated approximately five feet above ground level. The rotunda offers restaurants and retail shops for travelers. Although the associated ticketing hall and bag claim areas were built around 1969, the security checkpoint has been redesigned to meet changes in security requirements and the ticketing hall was recently widened to improve circulation.

The Concourse C facility was added in 1990s. It is connected to the A/B facility via a long, narrow corridor. Like the A/B structure, it could function as a stand-alone terminal. Retail amenities are grouped to service the ground boarding gates at the first floor and the PBB gates at the second floor.

In addition to the facilities directly supporting passenger travel, Transportation Security Administration (TSA) and law enforcement offices are located in the corridor connecting concourses A/B and C. Miscellaneous office, storage and support spaces are below Concourses A and B. Concessions storage, gate hold room and ground boarding walkway are at the ground level of the concourse C building. Second floor space includes airport management offices and meeting rooms, and connections to the parking structures.

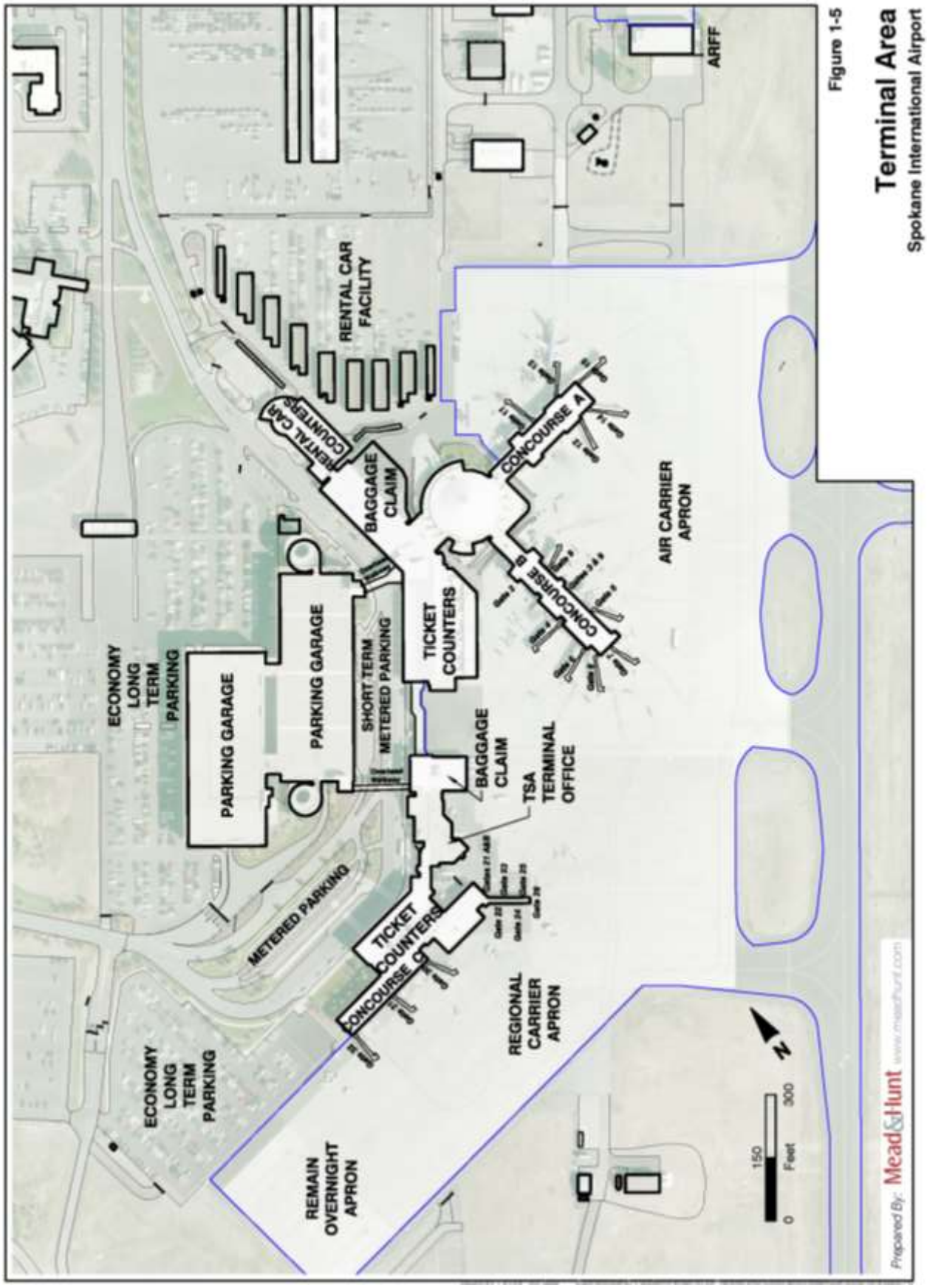
1.5 ANCILLARY FACILITIES

Ancillary facilities include support operations of the airport including emergency response, maintenance, and the Air Traffic Control Tower. They also include a variety of operations located on the North, East and South Ramps at the airport. An airport security inventory is also provided in this section.

1.5.1 Support Facilities

The Aircraft Rescue and Fire Fighting (ARFF) building is located northeast of the airline terminal, south of the air cargo facilities, and staffed by Spokane County. When an aircraft emergency is declared, emergency vehicles leave the ARFF building and proceed to the incident or specified staging positions in accordance with standard operating practices. The available equipment combined with incident response times classifies the Airport as “Index C” according to Code of Federal Regulations (CFR), Title 14 Part 139, *Certification of Airports*.

The Airfield Maintenance Department is responsible for keeping the airfield clear of snow during the winter months. Snow is discharged on Airport property, east of the approach end of Runway 21. The Department also operates the deicing trucks that spray chemicals on commercial aircraft prior to departure. Commercial aircraft are usually deiced at the gate or on the terminal ramp. General aviation aircraft may utilize the FBOs for deicing service.


Terminal Area
Spokane International Airport
Figure 1-5
ARFF
RENTAL CAR FACILITY
RENTAL CAR COUNTERS
BAGGAGE CLAIM
CONCOURSE A
CONCOURSE B
AIR CARRIER APRON
TICKET COUNTERS
SHORT TERM METERED PARKING
PARKING GARAGE
PARKING GARAGE
ECONOMY LONG TERM PARKING
BAGGAGE CLAIM
TSA TERMINAL OFFICE
METERED PARKING
TICKET COUNTERS
CONCOURSE C
REGIONAL CARRIER APRON
ECONOMY LONG TERM PARKING
REMAIN OVERNIGHT APRON
N
150
0
300
Feet
Prepared By: Mead&Hunt

The air traffic control tower (ATCT) is located south of Runway 7/25 and east of the National Guard facility. The ATCT became operational in August of 2010. The ATCT is staffed 24 hours a day. The elevation of the ATCT 2,650 feet above mean sea level and has a cabin floor height of 2,623 feet above mean sea level.

1.5.2 North Building Area

The north building area is located north of the passenger terminal and west of Taxiway A. In addition to the ancillary facilities described earlier, the north ramp contains the west cargo apron and the air cargo and fuel facility centers. The west cargo apron is 400,500 square feet. Access to this area is provided via Flint Road from Airport Drive. Facilities located in the north building area are illustrated in **Figure 1-6**.

The fuel facility is located west of the approach end of Runway 21, north of the west cargo apron. All fuel is stored in above ground tanks, including three Jet A fuel storage tanks and one tank each for 100 Avgas and 100 low lead Avgas. Fuel trucks enter the property through Gate K and are escorted by Airport staff to the facility for dispensing. Fuel storage, refueling, and testing are managed and maintained by the Airport.

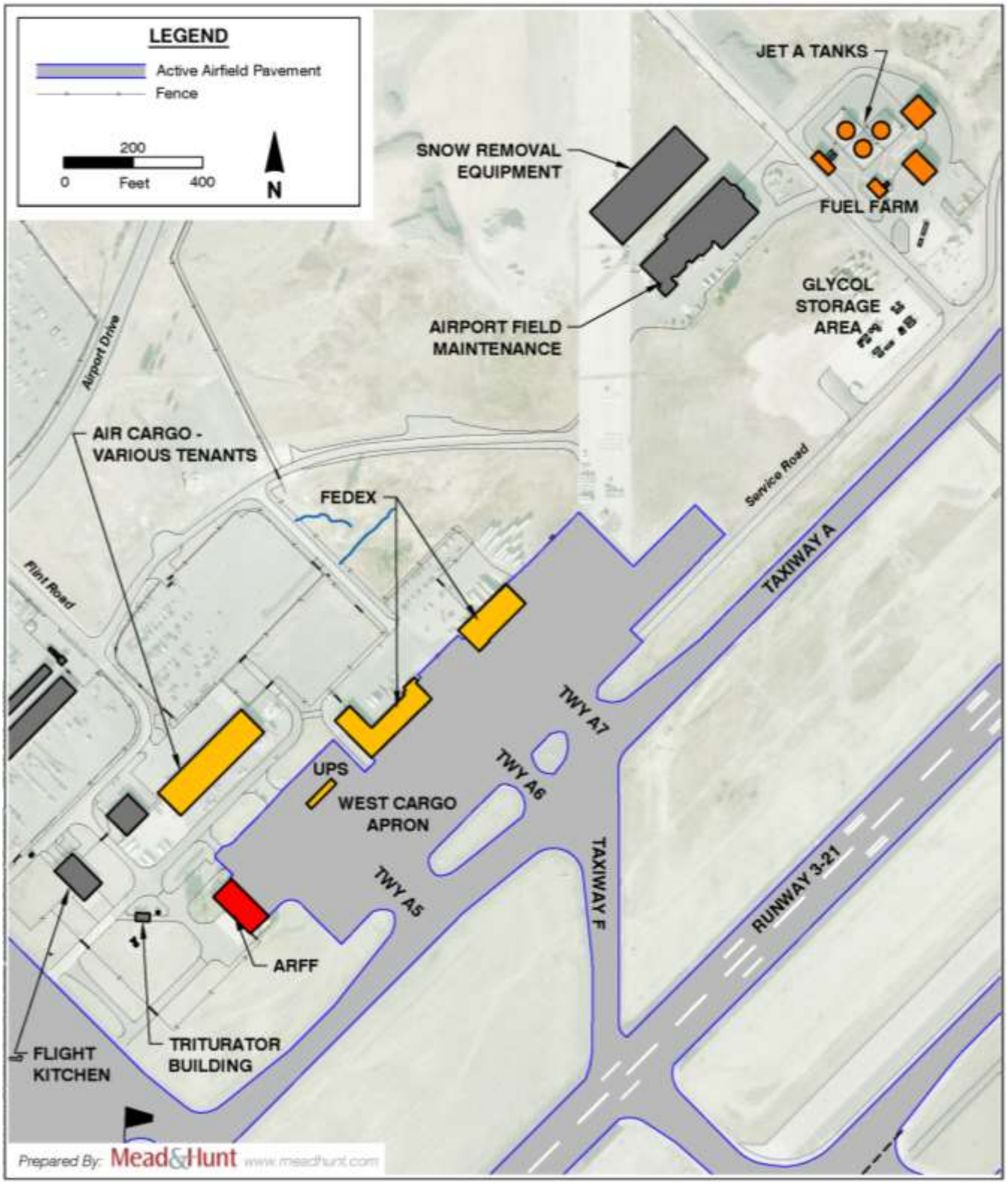


Figure 1-6

North Ramp Building Area

Spokane International Airport

1.5.3 East Ramp

The facilities located on the east side of the Airport support general aviation operations. These include fixed base operators (FBOs). FBOs and specialty aeronautical service operators provide a wide range of general aviation services such as aircraft maintenance, fueling and ground service, deicing, aircraft charter, flight lounge and lobby, flight training, car rental, and hangar rental. Five aprons offer airside access to the east ramp buildings and facilities.

- Triangle ramp (375,000 square feet)
- Eastside air cargo apron (400,500 square yards)
- Central general aviation ramp (649,800 square yards)
- North pilot ramp (198,000 square yards)
- South pilot ramp (500,400 square yards)

The aprons provide airside access to multiple facilities serving different functions. The central general aviation ramp and north and south pilot ramps are actively used by a variety of tenants, including service and maintenance FBOs, U.S. Customs and Border Patrol (U.S. CBP), and a flight school. The east ramp aprons and buildings are detailed in **Figure 1-7**.

The triangle ramp and eastside cargo apron are located north of the central ramp. They may be used as auxiliary aircraft parking for airlines or cargo operators. When military aircraft were displaced from Fairchild Air Force Base during runway construction in 2011, some were relocated to the triangle and eastside cargo aprons. Both aprons were originally constructed to entice cargo to move from the west cargo ramp. The goal was to ease traffic congestion near the passenger terminal and on Taxiway A. At this time there are no cargo operations or established facilities on either the triangle or east cargo aprons.

A regional distribution center operated by the U.S. Postal Service (USPS) is located on the northeast side of the airfield, just south of the approach end of Runway 21. The USPS facility is designated as a processing and distribution center for mail that is unloaded from cargo aircraft. The USPS facility does not have direct access to the airfield and mail is trucked to and from the west cargo apron. From the facility, trucks distribute mail throughout the region.

Two full service FBOs – Spokane Airways and XN Air –operate at GEG. Spokane Airways is located on the south end of the central ramp and XN Air has buildings on the north and south pilot ramps. Empire Airlines is located on the north pilot ramp and provides aircraft maintenance services.

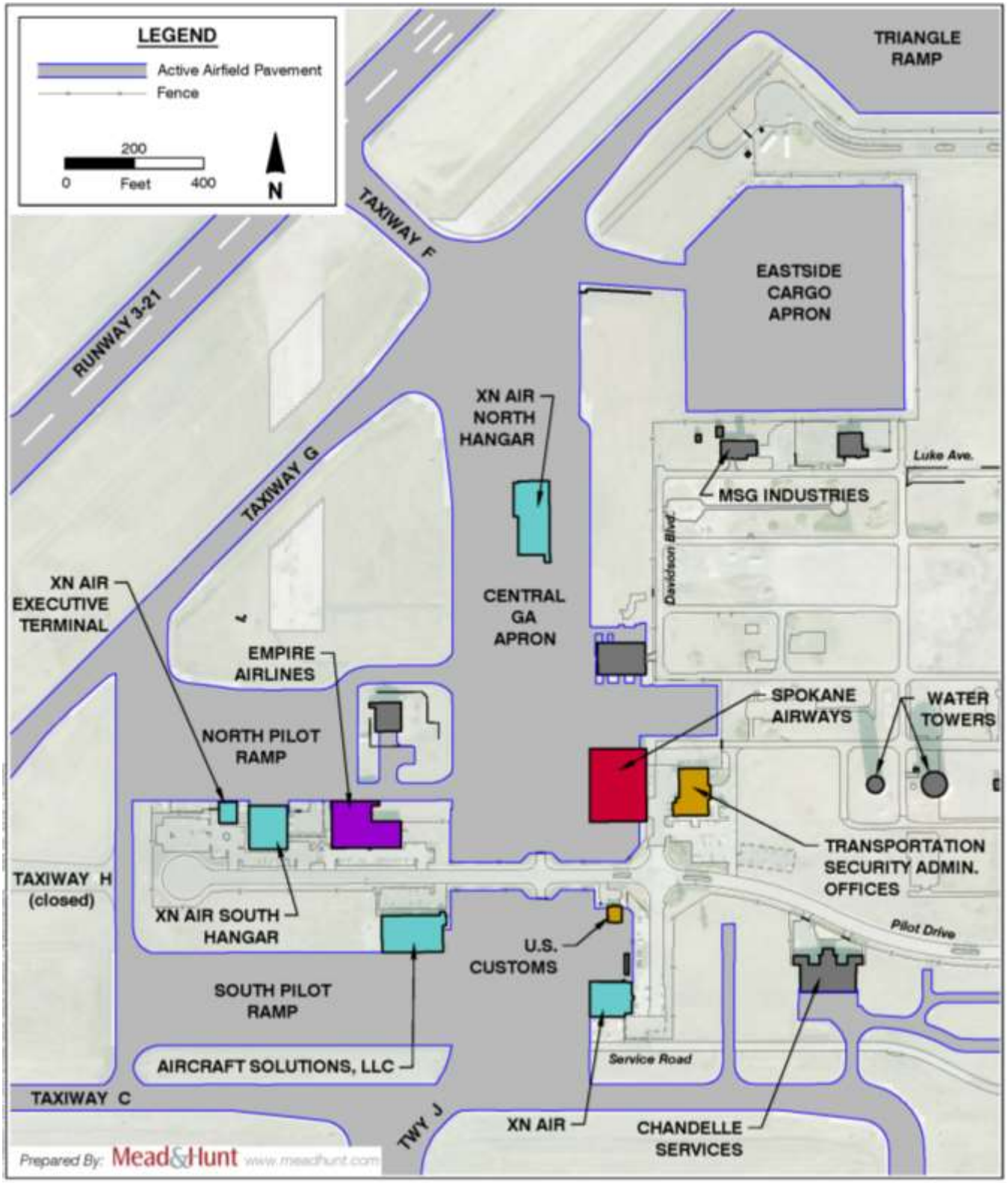


Figure 1-7

East Ramp Building Area

Spokane International Airport

The Airport is designated Port of Entry into the United States by the U.S. CBP. The U.S. CBP screening facility is located on the south pilot ramp. The facility operates as an on-call service for international charter and general aviation flights.

The Transportation Security Administration (TSA) occupies several buildings east of Spokane Airways and the general aviation ramp. The TSA helps screen commercial passengers and baggage, and helps secure the perimeter of the Airport.

In conjunction with Spokane Falls Community College (SFCC), the University of North Dakota's (UND) School of Aerospace Science offers flight training at the Airport. The flight school is located on the central general aviation ramp.

Street access to the facilities located on the south side of the east ramp, including the U.S. CBP and the FBOs, is provided by Pilot Drive from Geiger Boulevard and the Grove Road/Interstate 80 Interchange. The north facilities, including the USPS regional distribution center, are accessed using either Spotted Road from Airport Drive, or Bush Street and Alton Drive from Geiger Boulevard.

1.5.4 South Ramp

The south ramp is located south of Runway 7/25 and east of the approach end of Runway End 3. Aircraft access the south ramp from Taxiway K. The south ramp contains the MRO apron (maintenance, repair, and overhaul). The MRO apron is 640,000 square feet in size and hosts two major maintenances facilities. The south ramp and facilities are shown in **Figure 1-8**.

The facilities on the south ramp include a 52,000 square foot hangar and six acres of ramp and aircraft storage area. Associated Painters has a 41,000 square foot aircraft paint facility on the south ramp. An Army National Guard facility is located south of the MRO apron.

Facilities on the south ramp are located 1.5 miles from the Grove Road/Interstate 80 interchange and are accessed using Electric Avenue from Geiger Boulevard. The new air traffic control tower is located southeast of the MRO apron.

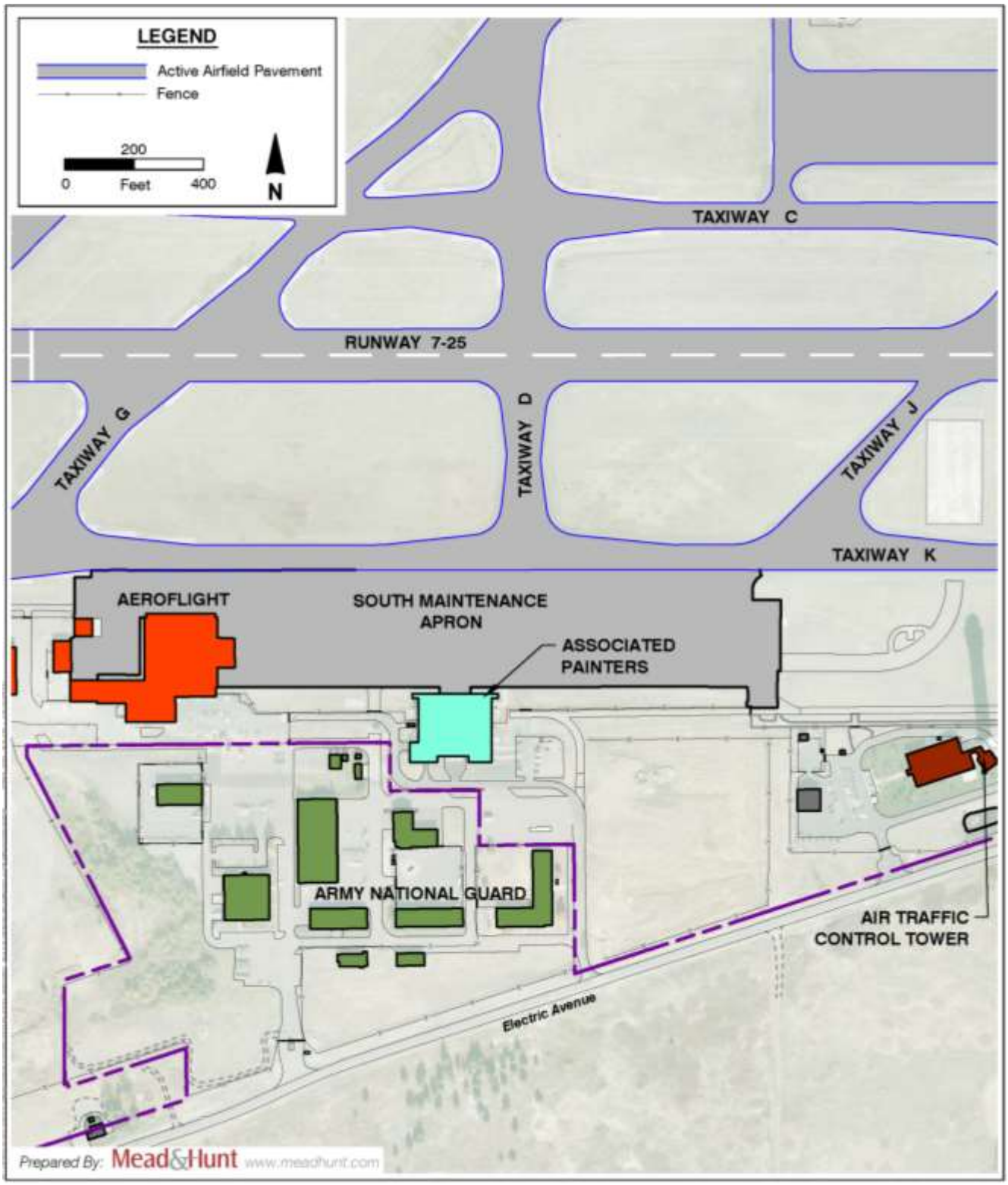


Figure 1-8

South Ramp Building Area

Spokane International Airport

1.5.5 Airport Security Inventory

As a certified Part 139 Airport, the Airport is required to maintain secure, limited access to the airfield. Multiple agencies are responsible for keeping the Airport secure from unauthorized people and other potential hazards. These agencies include the TSA, airport police, local police and airport operations personnel.

A perimeter fence is installed at the Airport with the purpose of limiting access to the airfield and features vehicle and pedestrian gates. **Figure 1-9** details the existing fence layout and each gate at the Airport. A total of 35 gates allow for vehicle and pedestrian access to the airfield by authorized personnel. Two types of gates are utilized at Spokane: an automatic security card reader gate and chained vehicle gates.

1.6 BUSINESS PARK

The Business Park has 1,330 acres available for development across nine development categories. This vacant land may be developed through third party development or the Airport can build-to-suit a potential tenant, and then leases the land and building back to the tenant. In addition to available parcel development, existing buildings are available for lease in the Airport Business Park and the Air Cargo complex. The park and the Airport as a whole have been granted foreign trade zone status (FTZ No. 224).

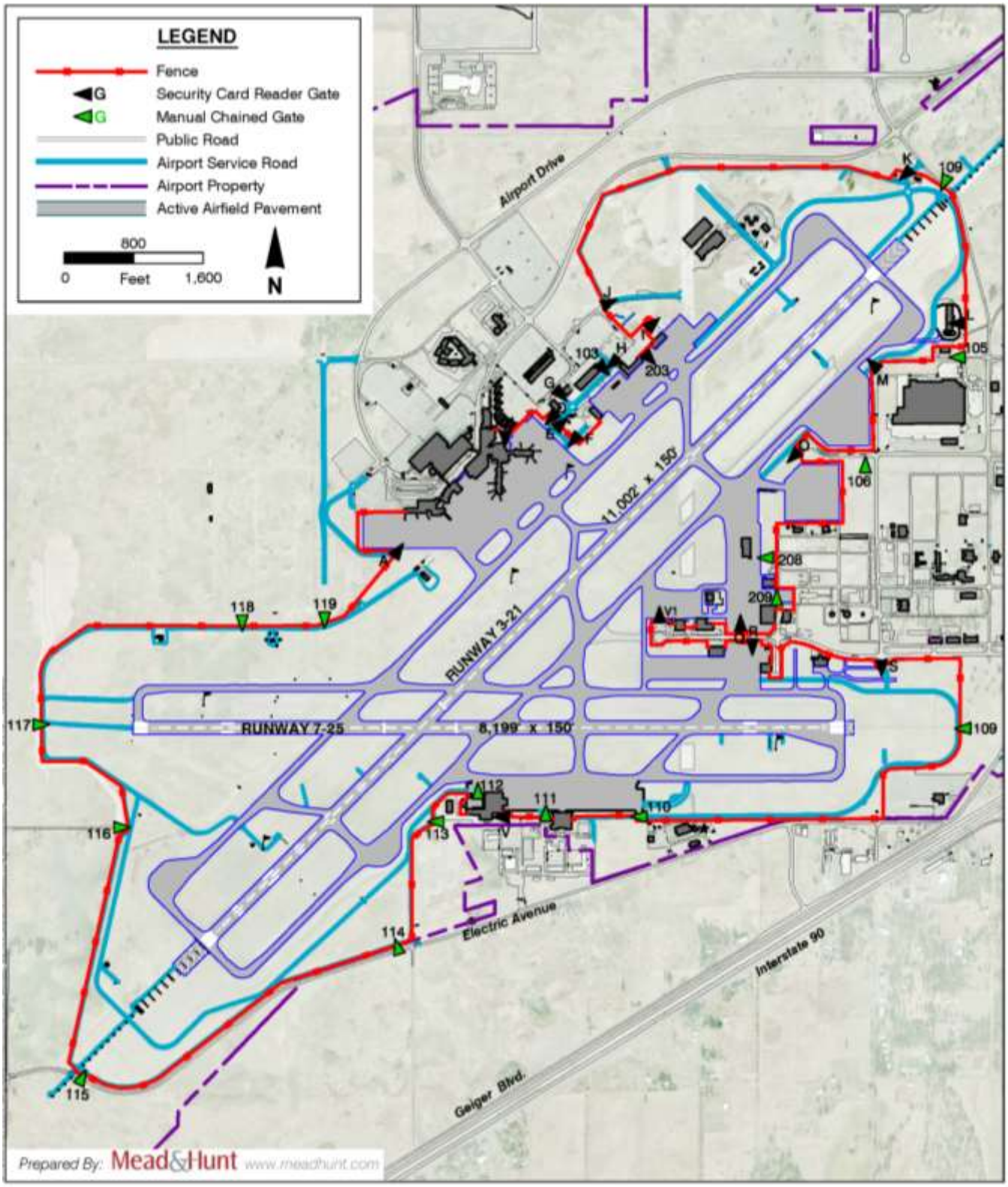


Figure 1-9

Perimeter Security

Spokane International Airport

Table 1-5: Airport Real Estate Area	
Real Estate Area	**Acres**
Airport Business Park (ABP)	510
Airport Business Park – Industrial (ABP-I)	100
Air Cargo	60
Aircraft Maintenance	31
Airport Drive	104
Commercial Aviation	7
Corporate and General Aviation Hangar Development	29
Large Parcels	402
Technology Park	84

Source: http://spokaneairports.net/abp_main.htm

Access to the Business Park is provided initially by the Grove Road entrance off of I-90 which becomes Flightline Boulevard at the business park. Once on the airport property, the Business Park is served by a network of internal roads. Other major roads include Will D. Alton Lane, Spotted Road, Pilot Road, and Godfrey Boulevard. Parcels for corporate and general aviation use have taxiway access.

1.7 REGIONAL CIRCULATION AND ACCESS

Specific transportation features linked to Spokane International Airport and summarized in this inventory include:

- Airport Ground Access
- Airport Roadway and Curbside Facilities
- Parking Facilities
- Public Transportation
- Rental Car Facilities
- Existing Traffic Conditions and Planned Roadway Improvements

Figure 1-10 indicates parking lot locations and vehicle access points for the Airport.

1.7.1 Airport Ground Access

Ground access system to GEG includes Interstate, regional and local access roadways, on-airport circulation roads, and associated ground access facilities. Major roads include I-90, U.S. Highway 2, Spotted Road, Flint Road. Airport Drive which serves as the primary route to and from the terminal facilities. The primary access to the Airport's Business Park area is provided by Flightline Boulevard.

1.7.2 Airport Roadway and Curbside Facilities

Airport Drive provides primary access to the terminal facilities. Airport Drive is comprised of a couplet roadway, which begins east of the intersection with Spotted Road. Traffic bound for the rental car return, north shuttle parking, and Air Cargo Facilities exits Airport Drive at Flint Road. Traffic destined for the outside parking, garage parking, and Concourses A, B and C continues along Airport Drive.

1.7.3 Parking Facilities

Vehicle parking facilities at GEG include spaces for public parking, employee parking and rental car parking. Public parking consists of two parking garages, three outside parking lots and two short-term metered parking areas. There are 6,870 parking spaces are available for public use.

An additional 1,060 parking spaces are available in the two designated employee parking lots in the vicinity of Flint Road and McFarlane Road. The Flint Employee parking lot is located north of the Air Cargo terminal and contains 550 parking spaces. The McFarland Employee lot is located north of the Outside Lot parking area and contains approximately 520 parking spaces.

1.7.4 Public Transportation

Spokane Transit Authority (STA) Route 60, *Airport/Browns Addition,* provides bus service from the STA facility in downtown Spokane to the Airport terminal. Spokane Cab Taxi Service is the sole taxi service provider. There are 24 hotels in the vicinity that provide shuttle services to and from the Airport.

1.7.5 Rental Car Facilities

There following eight rental car companies operate at GEG.

- Alamo
- Avis
- Budget
- Dollar
- Enterprise
- Hertz
- National
- Thrifty

The pick-up and drop off facilities are shared between the rental car companies. The pick- up/return lot is located northeast of the terminal facilities baggage claim area.

1.7.6 Existing Traffic Conditions and Planned Roadway Improvements

A traffic study, conducted by DKS Associates in 2010, identified the Level of Service (LOS) for Airport Drive at Flint Road (inbound) as "A" for morning peak hour (5:00A.M.) and "C" for midday peak hour (12:15). No significant delays were indicated at this location.

GEG is in the process of evaluating options for improvements to Airport Drive in the vicinity of terminal where passengers are dropped off and picked-up to improve traffic and pedestrian movements and reduce congestion for inbound and outbound passengers using the airport, shown in **Figure 1-10**.

The current draft Spokane Regional Transportation Council comprehensive study identifies 10 transportation alternatives for the entire West Plains area; two of the ten alternatives have a direct linkage to GEG. Alternative 2, *New Minor Arterial through Airway Heights south of U.S. Highway 2*, is a transportation alternative that could directly affect the access to Airport property at the Flint Road intersection. Transportation Alternative 2 could affect current eastbound traffic patterns along U.S. Highway 2. Alternative 8, *Geiger Interchange Modifications*, is the other transportation alternative that could affect the access to and from airport property. Alternative 8 will make modifications to the I-90/Geiger interchange to help improve congestion at the intersection of Geiger Blvd and Flightline Blvd. The improvements to the existing four way stop intersection include a free right turn lane for traffic accessing Geiger Blvd heading north and the signalization at the intersection.

WSDOT has currently awarded a reconstruction project for the north and southbound lanes of I-90 from Geiger Road to the Spokane viaduct. This project should not alter the Average Daily Traffic (ADT) to or from the Airport.

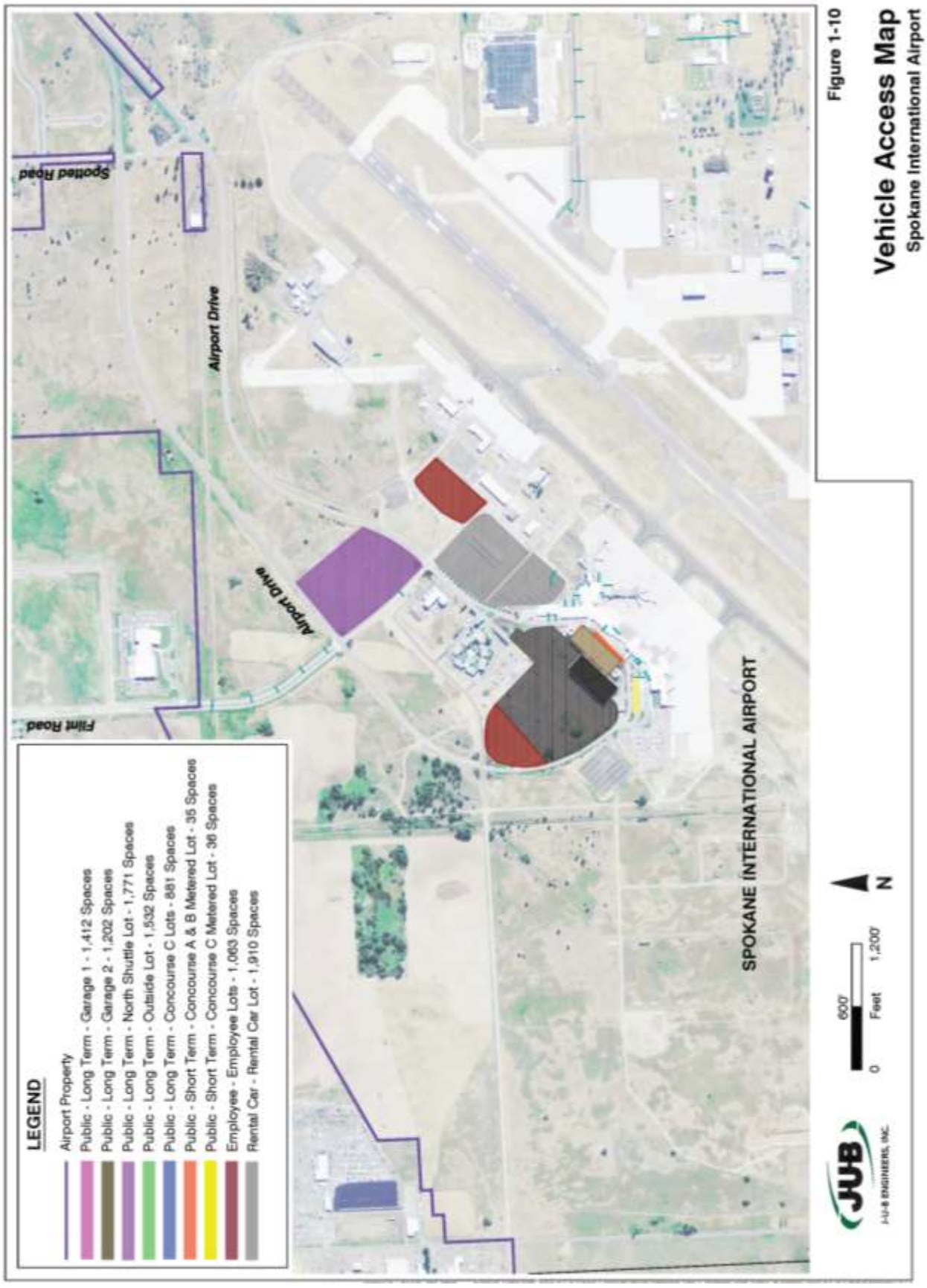

Spotted Road
Airport Drive
Airport Drive
Flint Road
SPOKANE INTERNATIONAL AIRPORT
LEGEND
Airport Property
Public - Long Term - Garage 1 - 1,412 Spaces
Public - Long Term - Garage 2 - 1,202 Spaces
Public - Long Term - North Shuttle Lot - 1,771 Spaces
Public - Long Term - Outside Lot - 1,532 Spaces
Public - Long Term - Concourse C Lots - 881 Spaces
Public - Short Term - Concourse A & B Metered Lot - 35 Spaces
Public - Short Term - Concourse C Metered Lot - 36 Spaces
Employee - Employee Lots - 1,063 Spaces
Rental Car - Rental Car Lot - 1,910 Spaces
600
0
Feet
1,200
N
JUB
JUB ENGINEERS, INC.

Figure 1-10

Vehicle Access Map

Spokane International Airport

1.8 ENVIRONMENTAL INVENTORY OVERVIEW

This section describes the natural environment at the Airport, and identifies environmental features that have the potential to influence future planning decisions. Environmental features described in this inventory include hydraulic features such as floodplains, surface water, and wetlands; aquifer recharge areas; critical farmland; known hazardous material sites; known threatened and endangered species habitat; areas with air quality maintenance standards; and cultural and historic sites.

1.8.1 Floodplains, Surface Water and Wetlands

Figure 1-11 was developed using information from the following sources: Federal Emergency Management Agency Flood Insurance Rate Maps; Washington State Department of Natural Resources Water Typing Base Maps; National Wetland Inventory maps; and, a 2009 Wetland Inventory for Spokane International Airport (Dawes 2009). The most significant hydrological feature in the area of GEG is an unnamed drainage that initiates near Runway End 21 and flows toward the east.

1.8.2 Aquifer Recharge Areas

Figure 1-12 displays critical aquifer recharge areas (CARAs) within the airport property, which were identified using information obtained from the Spokane County GIS Department. Washington Administrative Code Section 365-190-030(2) defines CARAs as areas that have a critical recharging effect on aquifers used for potable water. CARAs have geologic properties associated with high infiltration rates. High infiltration rates contribute to the replenishment of ground water, but also create a potential for contamination of ground water resources.

CARA are rated as having either a high, moderate or low susceptibility based on a combination of one or more of the following variables: scientific analysis of soils; hydraulic conductivity (the ease with which water moves between the surface and aquifers); annual rainfall; the depth to aquifers; the importance of the material between soils and aquifers (Vadose zone); and, wellhead protection information. Designated wellhead protection areas are considered high-susceptibility areas. Spokane County assigns a one thousand-foot buffer for wellheads without an engineered wellhead protection zone. The GEG property is dominated by moderately susceptible CARAs.

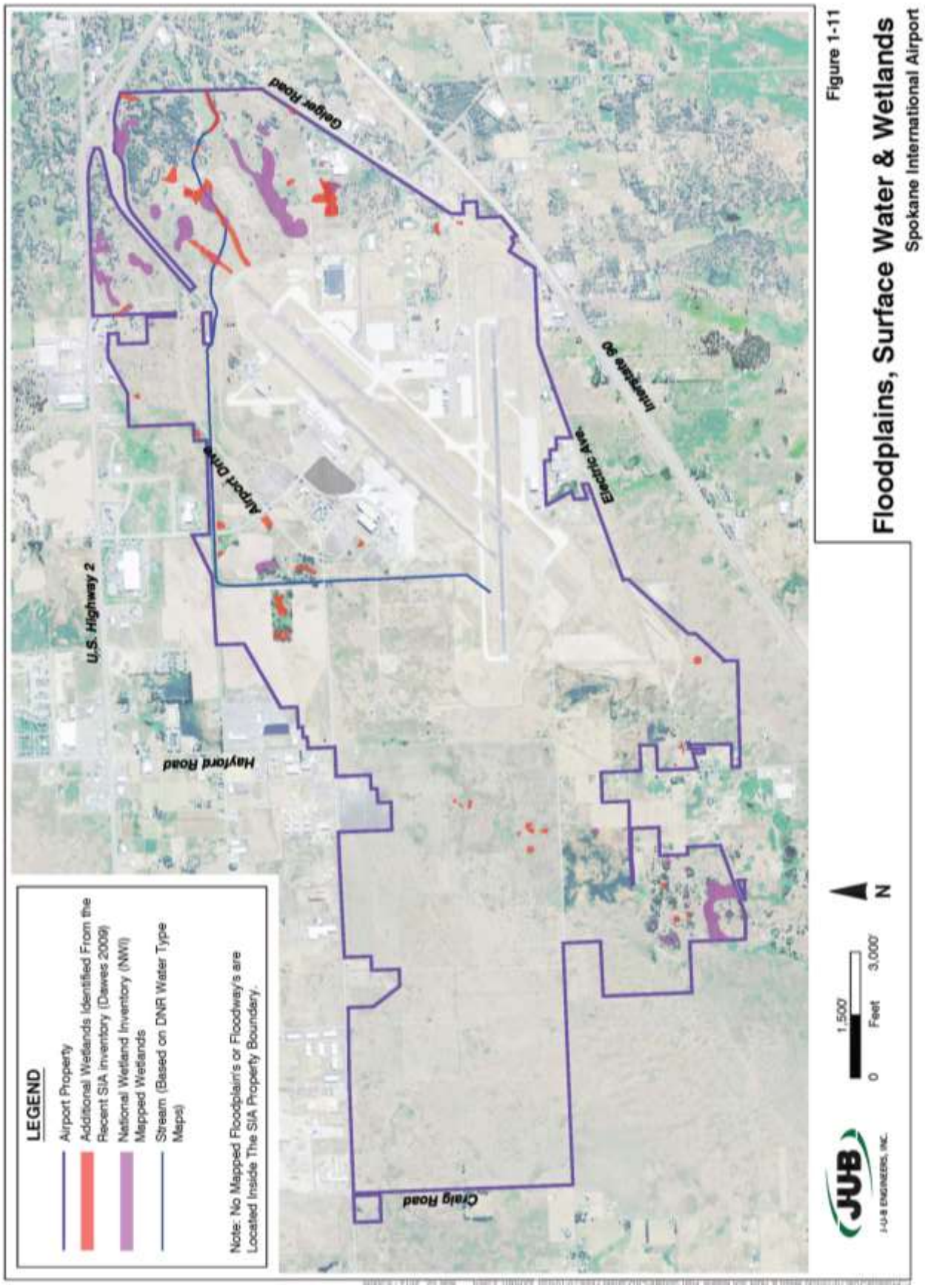


Figure 1-11
Floodplains, Surface Water & Wetlands
Spokane International Airport
LEGEND
Airport Property
Additional Wetlands Identified From the Recent SIA inventory (Dawes 2009)
National Wetland Inventory (NWI) Mapped Wetlands
Stream (Based on DNR Water Type Maps)
Note: No Mapped Floodplain's or Floodway's are Located Inside The SIA Property Boundary.
Geiger Road
Airport Drive
Haylord Road
U.S. Highway 2
Craig Road
Interstate 90
Electric Ave.
1,500
0
Feet
3,000
N
JUB
JUB ENGINEERS, INC.

1.8.3 Critical Farmland

The Farmland Protection Policy Act (FPPA) classifies mapped soil types into the following categories: prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be in agricultural production. According to the U.S. Department of Agriculture – Natural Resource Conservation Service (NRCS), the farmland can be forestland, pastureland, cropland, or other land, but not water or urban built-up land.

NRCS defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor.

NRCS defines unique farmland is land other than prime farmland that is used for production of specific high-value food and fiber crops. It has favorable soil and climatic conditions and adequate moisture supply to produce economically sustainable yields of high quality crops when treated and managed according to acceptable farming methods.

NCRS defines farmland of statewide or local importance is land other than prime or unique farmland that is determined and designated as such by state or local governments.

Airport property contains a variety of designated farmland classifications which is shown on **Figure 1-13**. The information was obtained from the NRCS Web Soil Survey.

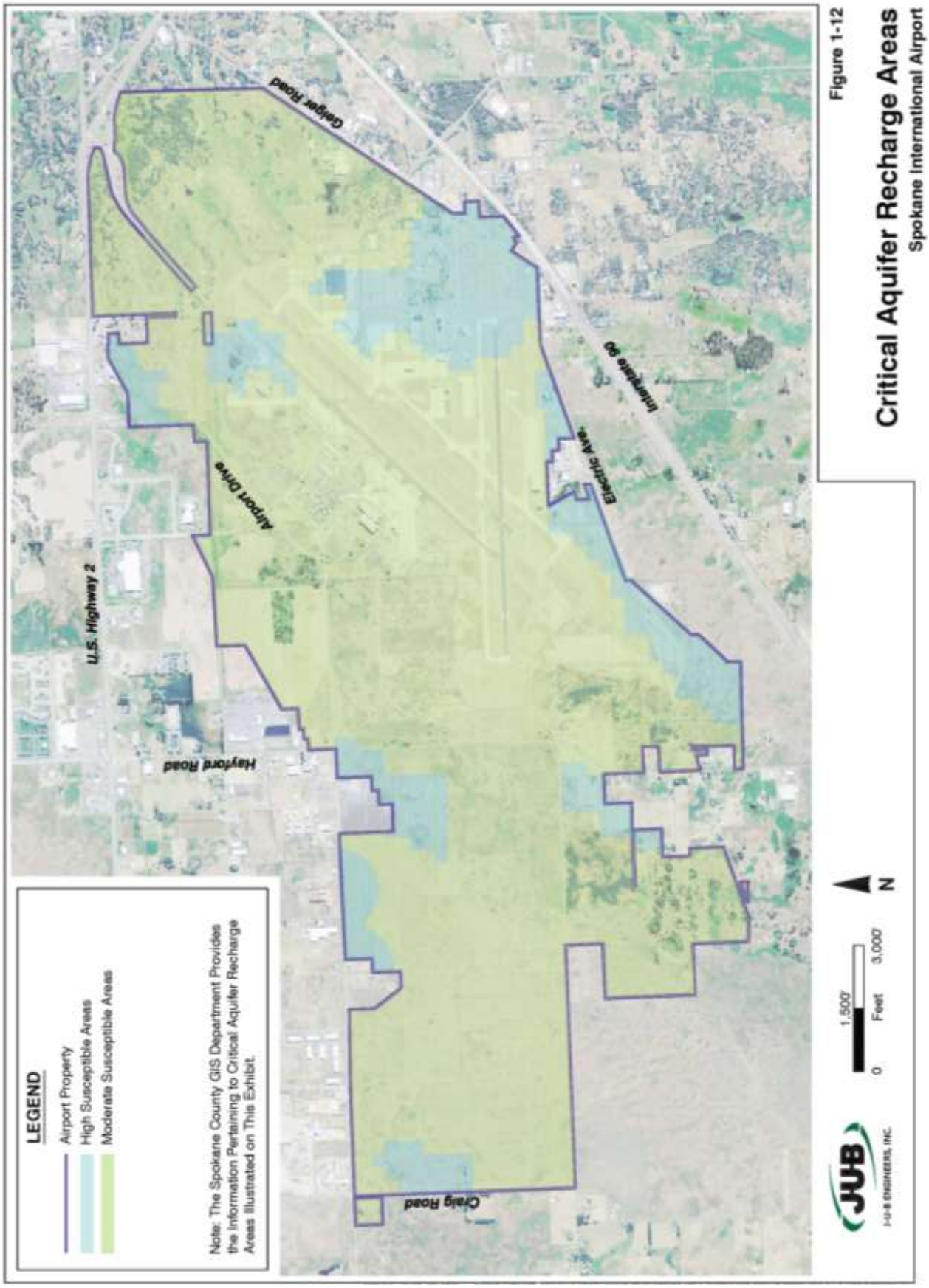


Figure 1-12
Critical Aquifer Recharge Areas
Spokane International Airport
Geiger Road
Interstate 90
Electric Ave.
Airport Drive
U.S. Highway 2
Hayford Road
Craig Road
LEGEND
Airport Property
High Susceptible Areas
Moderate Susceptible Areas
Note: The Spokane County GIS Department Provides the Information Pertaining to Critical Aquifer Recharge Areas Illustrated on This Exhibit.
1,500'
0
Feet
3,000'
N
JUB
ENGINEERS, INC.

1.8.4 Hazardous Material Sites

Executive Order 12088, as amended, directs Federal agencies to comply with "applicable pollution control standards," in the prevention, control, and abatement of environmental pollution; and consult with the EPA, State, interstate, and local agencies concerning the best techniques and methods available for the prevention, control, and abatement of environmental pollution.

An Environmental Site Assessment was not performed as part of the Master Plan. Information displayed on **Figure 1-14** was obtained from the Washington Department of Ecology's database. The Airport property is known to contain a Federal Used Defense Site (FUDS), regulated by the U.S. Army Corps of Engineers (USACOE). **Figure 1-14** illustrates known hazardous material sites within Airport property.

1.8.5 Threatened and Endangered Species Habitat

Information on threatened and endangered species habitat comes from a data request processed by Washington Department of Fish and Wildlife (WDFW). Portions of the Airport property may have been characterized as steppe habitat historically; however, this habitat type within existing airport property has been disturbed and may no longer warrant a priority habitat code. Known or mapped priority habitats and species occurrence are shown in **Figure 1-15**.

1.8.6 Air Quality Maintenance Areas

The United States Environmental Protection Agency has established National Ambient Air Quality Standards (NAAQS) for the following criteria air pollutants: carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, particulate matter, and lead. Following requirements of the Clean Air Act (CAA), air quality conditions within the U.S. are designated with respect to the NAAQS as attainment, maintenance, non-attainment, or unclassifiable. Areas that do not exceed the NAAQS are designated as attainment, while areas that do exceed the NAAQS are designated as non-attainment. Non-attainment areas typically require further analysis to demonstrate what environmental consequences the proposed action would have on air quality. Areas that were once non-attainment but have since met NAAQS are designated as maintenance. Air quality designations on airport property are shown in **Figure 1-16**.

There are two former non-attainment areas on the Airport property; both of these areas are currently in maintenance area designations. These maintenance areas are for PM-10 and CO. Outside of these areas, the rest of airport property is in attainment status for all air quality standards.

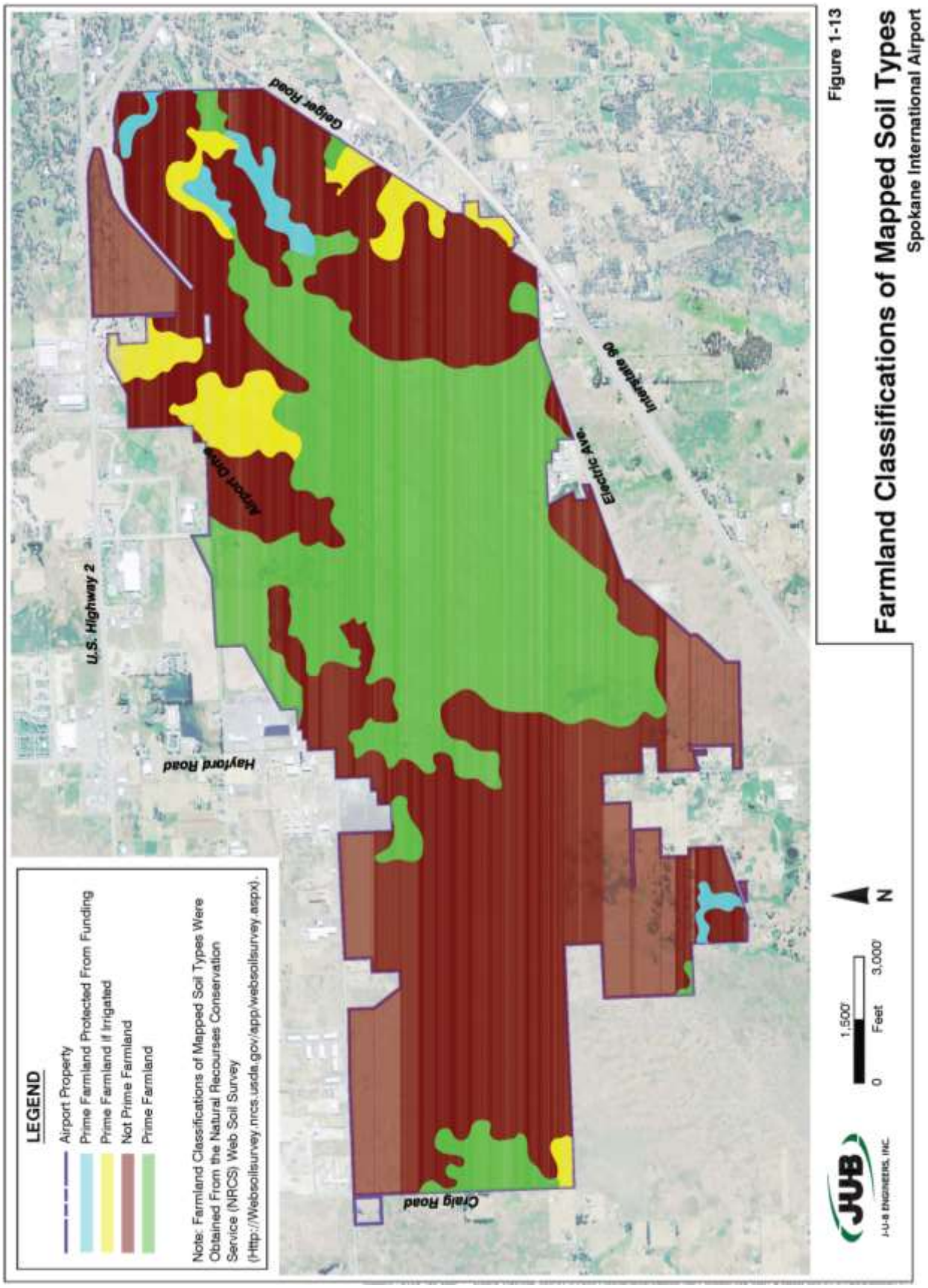


Figure 1-13
Farmland Classifications of Mapped Soil Types
Spokane International Airport
LEGEND
Airport Property
Prime Farmland Protected From Funding
Prime Farmland If Irrigated
Not Prime Farmland
Prime Farmland
Note: Farmland Classifications of Mapped Soil Types Were Obtained From the Natural Recourses Conservation Service (NRCS) Web Soil Survey (Http://Websoilsurvey.nrcs.usda.gov/app/websoilsurvey.aspx).
U.S. Highway 2
Geiger Road
Airport Drive
Hayford Road
Craig Road
Electric Ave.
Interstate 90
1,500'
0
Feet
3,000'
N
J-U-B ENGINEERS, INC.

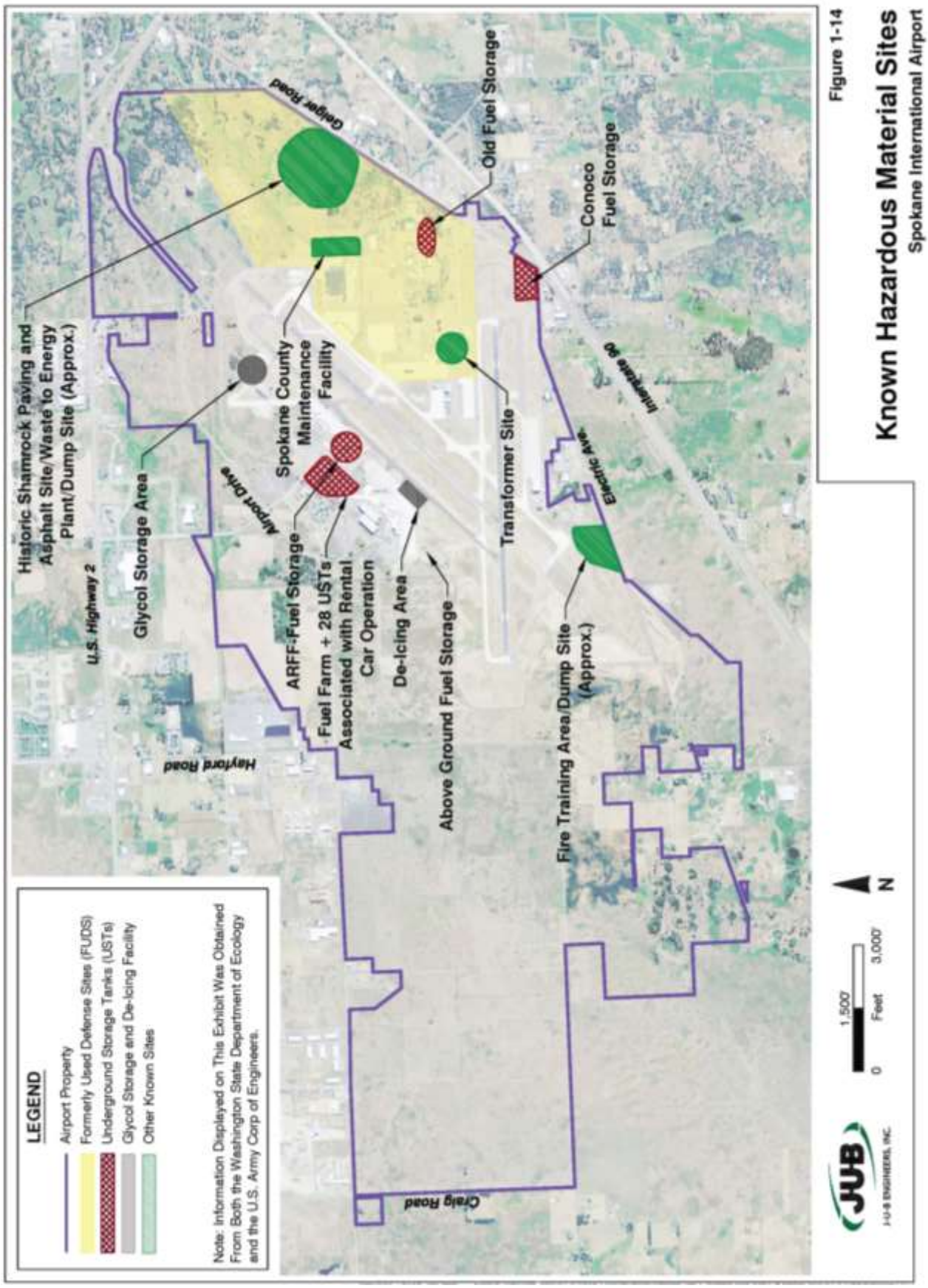


Figure 1-14

Known Hazardous Material Sites

Spokane International Airport

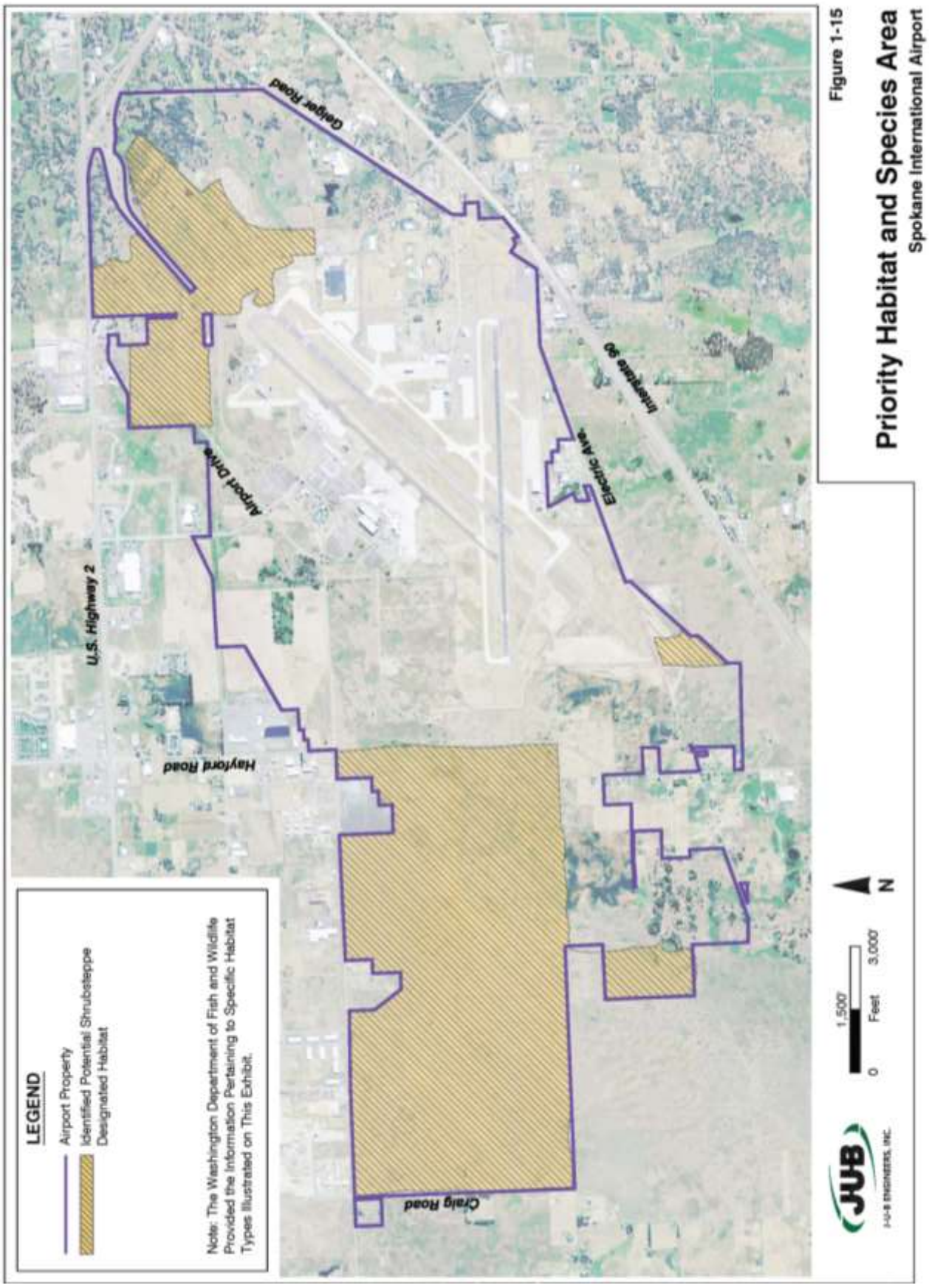


Figure 1-15
Priority Habitat and Species Area
Spokane International Airport
Geiger Road
U.S. Highway 2
Airport Drive
Haylord Road
Craig Road
Electric Ave.
Interstate 90
LEGEND
Airport Property
Identified Potential Shrubsteppe Designated Habitat
Note: The Washington Department of Fish and Wildlife Provided the Information Pertaining to Specific Habitat Types Illustrated on This Exhibit.
1,500'
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Feet
3,000'
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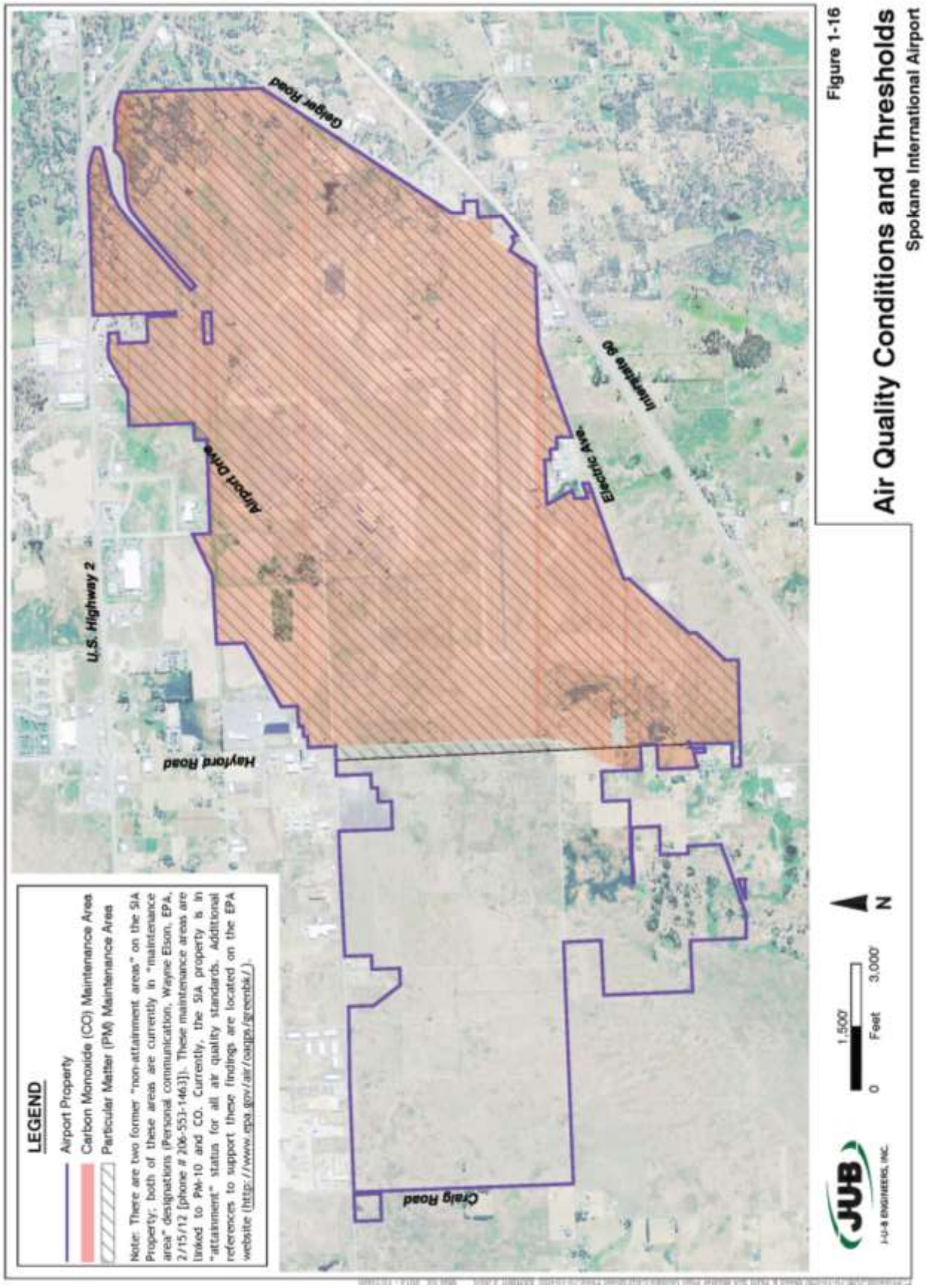

Geiger Road
U.S. Highway 2
Airport Drive
Electric Ave.
Interstate 90
Hayford Road
Craig Road
LEGEND
Airport Property
Carbon Monoxide (CO) Maintenance Area
Particular Matter (PM) Maintenance Area
Note: There are two former "non-attainment areas" on the SIA Property; both of these areas are currently in "maintenance area" designations (Personal communication, Wayne Elson, EPA, 2/15/12 [phone # 206-553-1463]). These maintenance areas are linked to PM-10 and CO. Currently, the SIA property is in "attainment" status for all air quality standards. Additional references to support these findings are located on the EPA website (http://www.epa.gov/air/oaqps/greenbk/).
1,500'
0
Feet
3,000'
N
JUB
J-U-B ENGINEERS, INC.

Figure 1-16

Air Quality Conditions and Thresholds

Spokane International Airport

1.8.7 Cultural and Historic Sites

Area surrounding the Airport was once occupied by ancestors of the Spokane Tribe throughout the Holocene epoch. Airport development projects have not found archaeological evidence of these first residents; however, archaeological sites may exist. The earliest recorded use of the property that is now GEG was by homestead farmers. The small community of Hayford developed from this agricultural foundation, evidence of which can be seen in some of the nearly 100 year old homes located southwest of the airport boundary. Local infrastructure development occurred throughout the 1920s and 1930s in anticipation of local growth. Aviation became the dominant local activity when the U.S. War Department purchased a small airport named Sunset Field and established Geiger Field in 1941. Buildings, airport features, railroad features, water features, and other cultural materials related to the historic use of Geiger Field during World War II are located within and around the present airport facility.

It is possible that some buildings located on airport property may be eligible for inclusion in the National Register of Historic Places (NRHP). The 1965 Spokane International Airport building was recognized for its architecture and design as part of the "Nifty from the Last Fifty" Washington State historic inventory. No buildings or features on the Airport are listed on the NRHP. Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to consider the effects of their actions on properties included or eligible for inclusion in the NRHP.

1.9 UTILITY OVERVIEW

This section summarizes the utilities that exist on the Airport property. The utility inventory map included in this section illustrates the approximate location of the utilities sufficient for planning level analysis (not survey quality). The utilities assessed in this section include water service, sanitary sewer service, storm water drainage, solid waste disposal, telephone and fiber optic lines, electrical power, natural gas supply and fuel storage and distribution. The Utility Map is illustrated in **Figure 1-17**.

1.9.1 Water Service

The City of Spokane provides water service to GEG. An 18-inch–diameter line brings water in from the south side, and a 24-inch-diameter line comes onto the Airport from the north side. Water is distributed throughout the airport property through various water lines.

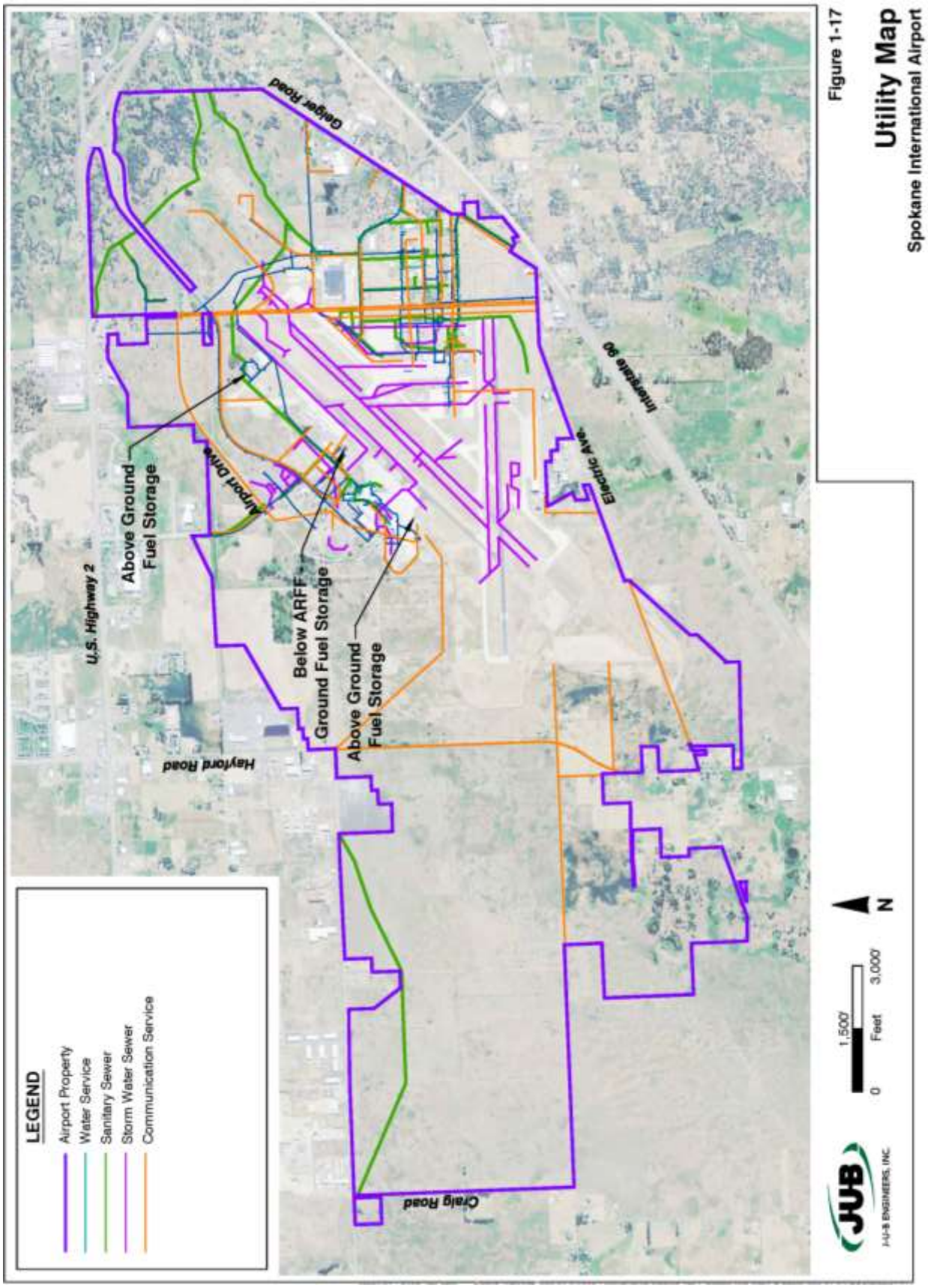


Figure 1-17
Utility Map
Spokane International Airport
Geiger Road
Interstate 90
Electric Ave.
Airport Drive
U.S. Highway 2
Above Ground Fuel Storage
Below ARFF Ground Fuel Storage
Above Ground Fuel Storage
Hayford Road
Craig Road
LEGEND
Airport Property
Water Service
Sanitary Sewer
Storm Water Sewer
Communication Service
1,500'
0
Feet
3,000'
N
JUB
JUB ENGINEERS, INC.

1.9.2 Sanitary Sewer Service

The City of Spokane Public Works Department provides sanitary sewer services to GEG. The waste water is collected at Airport Drive in front of the terminal and transported via a trunk line to the Spokane Wastewater Treatment Facility on the Spokane River. A lift station is located near Concourse C to pump waste water to the Airport Drive trunk sewer line. A dry line sewer is also in place a future westward expansion of the terminal building.

1.9.3 Storm Water Drainage

Storm water from the Airport is collected and transported through a series of collection structures to natural and man-made channels. While storm water ponding is not usually an issue at GEG, it can occur in the lower reaches of the drainage systems during heavy runoff periods. Also, seasonally high groundwater is a problem on the West Plains.

1.9.4 Solid Waste Disposal

Waste is deposited into trash receptacles that are located throughout the Airport. The waste is then collected at regular intervals by Waste Management of Washington, Inc. Trash receptacles are not shown on utility inventory maps.

1.9.5 Telephone and Fiber Optic Lines

Telephone and fiber optic lines are provided to the Airport from Qwest. Private companies may provide service within the airport through these lines. There are also intra-airport lines known as SI lines, which are owned by the Airport and provide intercom service within the Airport, and between selected hotels and rental car agencies. Airport businesses contract with telephone service providers independently for outside lines and equipment.

1.9.6 Electrical Power

Avista Utilities and Inland Power provide electric power to the Airport, which powers buildings and airfield lighting. The airport also has backup generators in the event of a power outage. These generators are provided for the ARFF Building, the fuel farm, the ATCT, the approach lighting systems and the terminal. Information provided on the location of the electrical power is considered proprietary and therefore not included as a separate map within this section.

1.9.7 Natural Gas Supply

Avista Utilities supplies natural gas to the Airport and surrounding areas. Information provided on the location of the natural gas lines is considered proprietary and not included as a map.

1.9.8 Fuel Storage and Distribution

Fuel is stored in multiple locations on airport property. The aircraft fuel storage facility is located northeast of the equipment storage and maintenance building. Glycol, used for deicing, is stored at a facility east of the fuel farm in above ground tanks. Four underground storage tanks are located at the ARFF facility. Fuel for emergency backup power and ground vehicles is stored in above ground tanks located next to the regulator building, southwest of the terminal.

Yellowstone Pipeline Co. maintains two lines inside the Airport's boundaries. A 3-inch line brings petroleum products into the fuel farm, and an 8-inch line transports petroleum products out of the Airport to FAFB and then on towards Moses Lake.

1.10 AERONAUTICAL SETTING

GEG and FAFB share overlapping arrival and departure corridors. The close proximity creates a complex operating environment. To mitigate risk, the control towers at both facilities coordinate extensively in the movement of airborne traffic.

1.10.1 Nearby Airports

Airport activity is influenced, in part, by the proximity of other airports. Because GEG is the largest airport in the region, most nearby airports have a minor competitive impact on airport activity. Of the nearby airports, FAFB is the nearest and has the greatest impact on operations due to the shared airspace. **Table 1-6**, Area Airports, identifies airports within 30 miles of GEG.

1.10.2 Regional Airspace and Air Traffic Control

The airspace that encompasses GEG and FAFB is designated as "Class C" Airspace C (See **Figure 1-18**). Separation services are available to aircraft operating within 20 miles from the centers of both airports. VFR operators must establish and maintain two-way radio communication with air traffic control and be equipped with an altitude encoding transponder.

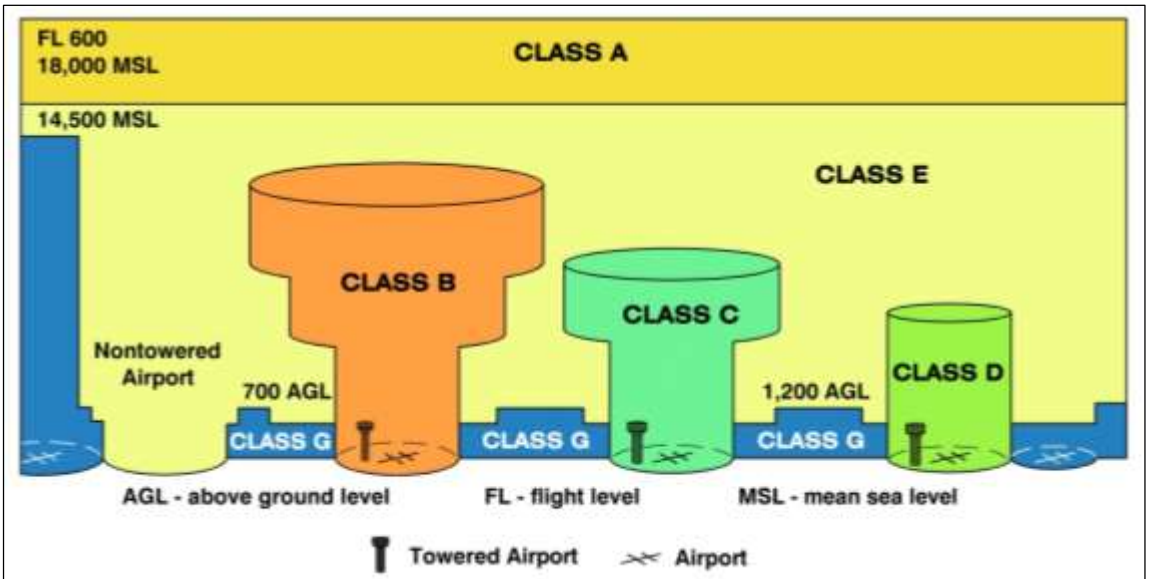
The control and separation of air traffic is complicated by overlapping arrival and departure corridors. The extended centerlines of both airports' primary runways are offset 20 degrees to one another. Aircraft approaching from the northeast to Runway End 21 at GEG or Runway End 23 at FAFB share a common intersection point. During VFR conditions (ceiling greater than 1,000 feet and visibility greater than 3 miles), pilots can visually maintain separation from other aircraft. During non-visual flight air traffic control must separate and sequence airborne traffic using a set of predefined rules. The amount of separation required increases significantly during non-visual conditions and subsequently, the arrival and departure rates of both airports drop appreciably.

Table 1-6. Area Airports

Airport Name [1]	*Owner*	Associated City (County)	Distance/Direction [2]	Based Aircraft [3]	Number of Runways	Longest Runway (ft.)	Surface [4]	Lighting Intensity [5]	Approach Visibility [6]	Control Tower	Airline Service	AvGas	Jet Fuel	Maintenance	Automobile Rentals
Spokane International	**City and County of Spokane**	**Spokane (Spokane)**	**–**	**67**	**2**	**11,002**	**Asph. or Conc.**	**H**	***½*** [7]	***Yes***	***Yes***	✓	✓	✓	✓
Area Airports															
Fairchild Air Force Base	U.S. Air Force	Spokane (Spokane)	5 W	0	1	13,899	Conc.	H	½	Yes	No	–	–	–	–
Felts Field	City & Co. Spokane	Spokane (Spokane)	9 NE	163	2	4,500	Conc.	M	¾	Yes	No	✓	✓	✓	–
Mead Flying Service	Private	Mead (Spokane)	12 NE	21	1	2,481	Asph.	–	Vis.	No	No	–	–	–	–
Deer Park Municipal	City of Deer Park	Deer Park (Spokane)	21N	73	2	6,100	Asph.	M	1	No	No	✓	✓	✓	–
Cross Winds	Private	Clayton (Stevens)	22 N	2	2	3,800	Turf	–	Vis.	No	No	–	–	–	–
Rosalia Municipal	Town of Rosalia	Rosalia (Whitman)	23 S	9	1	2,807	Asph.	M	Vis.	No	No	✓	–	–	–
Davenport	City of Davenport	Davenport (Lincoln)	26 W	11	2	2,747	Asph.	M	Vis.	No	No	✓ ✓	–	–	–
Willard Field	City of Tekoa	Tekoa (Whitman)	30 SE	10	1	2,261	Asph.	M	Vis.	No	No	✓	–	✓	–
Coeur d'Alene Air Terminal	County of Kootenai, ID	Coeur d'Alene (Kootenai, ID)	30 ENE	206	2	7,400	Asph.	H	½	No	No	✓	–	✓	✓

[1] Airports within 30 nautical miles of Spokane International Airport
[2] Distance in nautical miles and approximate between airport reference points. Direction from Spokane Intl.
[3] FAA Airport Master Record data as of November 2010; totals exclude ultralights
[4] Asph. = asphalt; Conc. = concrete. For longest runway.
[5] L=low; M=medium; H=high. For longest runway.
[6] Lowest visibility minimums for instrument approach procedures; distance in statute miles. Vis = No instrument approach – VFR only.
[7] Spokane International is outfitted with Category I, II and III instrument approaches for specially-equipped aircraft. A CAT II approach allows for decision heights at 100 feet above runway elevation while a CAT III approach provides guidance to the surface of the runway.

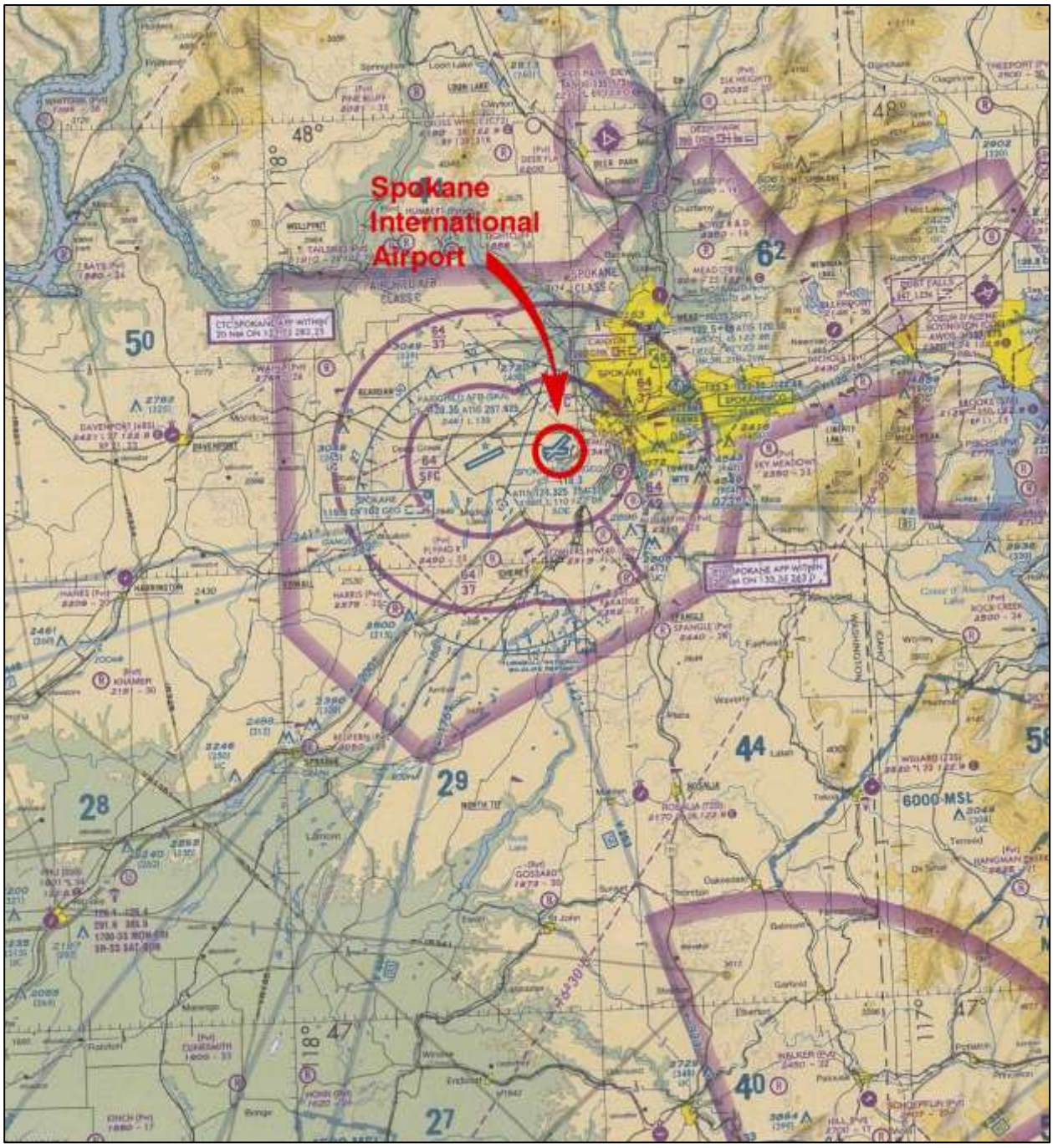
Source: Mead & Hunt



Airspace Class	Communication with ATC	Entry Requirements	Separation Services	Special VFR in Surface Area
A	Required for all operations	ATC clearance	All	N/A (No surface area)
B	Required for all operations	ATC clearance	All	Yes
C	Required for all operations	Two-way communications required prior to entry	VFR/IFR	Yes
D	Required for operations	Two-way communications required prior to entry	Runway operations	Yes
E	Required for IFR operations	Required for IFR operations	Required for IFR operations only	Yes
G	Not required	None	None	N/A (No surface area)

Figure 1-18

Airspace Classes



Source: skyvector.com, Seattle Aeronautical Chart

Figure 1-19

Airspace Map

1.10.3 Terminal Instrument Procedures

Terminal instrument procedures are published flight procedures that enable continued takeoff and landing operations during inclement weather conditions. Published takeoff and arrival procedures are in place for all four of the Airport's runways.

Approach Procedures

Instrument approach procedures are published to a specified runway end for each type of primary navigation. The degree of lateral and vertical accuracy varies according to the type of navigation used, on-board equipment available, and level of pilot certification or specially approved authorization. The most precise system currently available is an ILS Category-III approach, which enables landing with as little as 150 feet of forward visibility (Category-IIIb). An ILS Category IIIc approach would enable an airplane to land in zero visibility conditions, however, there are no Category IIIc approaches currently authorized. The Airport's Category IIIb approaches require 600 feet of forward visibility. **Table 1-7** identifies all of the approach procedures available for GEG.

Table 1-7. GEG Published Instrument Approach Procedures

	Runway Approach Ends			
	3	**21**	**7**	**25**
Procedure Type	ILS Cat-I ILS SA ILS Cat-II ILS Cat-IIIa + b RNAV (GPS) RNAV (RNP) VOR	ILS Cat-I ILS Cat-II ILS Cat-IIIa + b RNAV (GPS) RNAV (RNP)	RNAV (GPS) RNAV (RNP) Published Visual	RNAV (GPS) RNAV (RNP)

Source: FAA Instrument Approach Procedures published as of 2/24/2011.

Table Notes:

- ILS (Instrument Landing System)- Approach procedure using ground-based equipment at the runway having highly accurate lateral and vertical guidance.
- Category I, II, III- Indicates level of accuracy and performance associated with an ILS.
- SA- Special authorization required for aircrew and on-board equipment.
- RNAV (Area Navigation)- Approach procedure using on-board position determination.
- GPS (Global Positioning System)- Approach procedure using satellite-based navigational aids.
- RNP (Required Navigation Performance)- Indicates degree of accuracy associated with RNAV system. GEG's RNP procedures require special aircraft and aircrew authorization.
- VOR (Very High Frequency Omni-directional Range)- Approach procedure using a ground-based system of radio-beacons.
- Published Visual- Instrument procedure using ground visually identifiable reference positions.

The ILS procedures to Runway Ends 3 and 21 use ground-based equipment at the Airport. This equipment includes the following:

- Glide Slope Antennas (2)— A glide slope antenna provides vertical guidance for an ILS approach procedure. GEG has two glide slope antennas, one each for Runway End 3 and Runway End 21. The Runway End 3 glide slope is located abeam of the touchdown point approximately 1,100 feet from the Runway End 3 landing threshold, 450 feet east of centerline. The Runway End 21 glide slope is 941 feet from the landing threshold, 410 feet west of centerline. Glide slopes utilize the ground in front the antenna to reflect the signal into the approach corridor. As a result, the area in front of the antenna must be specially prepared and cleared in order to provide the required accuracy.
- Localizer Antenna Arrays (2)— A localizer antenna provides lateral guidance for an ILS approach procedure. GEG has two localizers, one each for Runway End 3 and Runway End 21. They are both positioned in the approach area 1,000 feet from the opposite runway ends on the extended runway centerline. Localizers require a clearance area between the antenna and touchdown zone to avoid signal blockage or interference.
- Marker Beacon Antennas- marker beacons transmit a signal upward to positively identify an aircraft position at critical points within the final approach segment of an instrument approach. These same positions can also be identified using a variety of other methods such that the number of marker beacons in service has declined over the years; the decline is expected to continue. GEG has an inner marker (IM) beacon located 1,000 feet along the extended centerline of Runway 3/21.
- Other equipment requirements— Other equipment required for obtaining the optimal performance of an instrument approach procedure include: approach lighting, runway marking and lighting, and weather reporting. The identification of these facilities is included **Section 1.3.7.**

Next Generation Navigation

Each runway at GEG has a published required navigation performance (RNP) approach procedure. These types of procedures are a critical step toward upgrading the National Airspace System to what is commonly referred to as NextGen. NextGen is the transition from ground-based air traffic control and navigation to a satellite-based / on-board system of air traffic management. Satellite infrastructure is in place with ground-based augmentation equipment installation nearing completion. RNP procedures use on-board equipment to establish the highest accuracy tolerance available. The technology enables equipped and trained operators to fly approach to lower approach minimums. RNP procedures are also being used to:

- Enhance airspace throughput capacity where airspace corridors are close together (such as between GEG and Fairchild Air Force Base),
- Reduce fuel consumption by enabling constant descent approaches that avoid level-off steps, and
- Reducing the Airport's noise exposure footprint by keeping approach procedures close to the Airport such that they more closely approximate a visual airport traffic pattern.

Departure Procedures

Similar to instrument approach procedures, instrument departure procedures are used for sequencing departing traffic so as to reduce the amount of radio communication needed and to avoid or otherwise identify terrain and obstacles. A departure procedure is available for each runway at GEG.

Surface Movement Guidance and Control

FAA Advisory Circular 120-57, *Surface Movement Guidance and Control System,* outlines requirements for aircraft surface movement during times of low visibility. Airports with instrument operations, like Spokane, are required to prepare a taxi plan in accordance with SMGCS requirements for times when the surface visibility is less than 1,200 feet. The purpose of SMGCS is to enhance position identification and reporting under low visibility conditions to reduce the potential for accidental incursion onto an active runway and taxiway incidences due to loss of positional awareness. The Airport established a SMGCS in 2000. The SMGCS plan at Spokane specifies operating procedures by aircraft and guidance for ground traffic by utilizing facilities, signage, lighting, and markings to help guide aircraft and vehicle movement.

SMGCS procedures are in effect when the RVR is below 1,200 feet and above 600 feet. Aircraft operate under SMGCS procedures exclusively on Runway 3/21. Arriving aircraft will typically be directed to land on Runway 3. If visibility minimums allow for landings on Runway 21 and the RVR is greater than 1,200 feet, then SMGCS procedures apply to Runway 21 also. Departures are allowed from both ends of Runway 3/21untill the RVR is lower than 600 feet, when operations at the Airport stop. Once on the ground, with direction from the control tower, aircraft follow low visibility taxi routes as designated in the Airport's SMGCS plan. Low visibility taxi routes are depicted **in Figure 1-3**.

Equipment and facilities installed at the Airport as stipulated in the established SMGCS plan include taxiway centerline lighting, runway guard lights, stop bar lights, geographic position markings, and taxiway guidance signs and markings.

Another technology available to the control tower to help locate and track air and ground traffic in low visibility is the Northrop Grumman Air NOVA 9000. The NOVA 9000 integrates data from sensors and databases and provides information on traffic movements on the surface of the Airport.

1.11 CONCLUSION

The inventory chapter begins the planning process by providing a benchmark of the Airport as it currently exists, both in relation to the surrounding community and the larger aviation system and as a physical inventory. The Airport itself is comprised of airside, terminal, and landside components that will be individually analyzed as part of this plan. The next chapter assesses future activity that the Airport should anticipate over the long term. Chapters 3, 4 and 5 will identify the facilities needed over the next 20-30 years for each of the airfield facilities, terminal facilities, and landside facilities.

CHAPTER 2

Aviation Forecasts

2.0 OVERVIEW

This chapter contains aviation activity forecasts for Spokane International Airport over a 20-year planning horizon. Aviation demand forecasts are an important step in the master planning process. Ultimately, they form the basis for future demand-driven improvements at the Airport, they provide data from which to estimate future off airport impacts such as noise and traffic, and they are often incorporated by reference into other studies and policy decisions. This chapter, which presents aviation activity forecasts through 2030, is organized as follows:

1. Overview
2. Forecasting Approach
3. Airline Passenger Forecasts
4. Airline Operations Forecasts
5. Enplaned/Deplaned Cargo and Mail Forecasts
6. All Cargo Operations Forecasts
7. Based Aircraft Forecasts
8. Based Aircraft Fleet Mix
9. General Aviation Operations Forecasts
10. Instrument Operations Forecasts
11. Military Operations Forecasts
12. Peak Passenger Activity and Operations Forecasts
13. Forecast Summary and TAF Comparison
14. 50-Year Forecast

The Federal Aviation Administration's (FAA) ***National Plan of Integrated Airport Systems*** (NPIAS) categorizes Spokane International Airport as a "Primary Small Hub Airport." The NPIAS defines a Primary Small Hub Airport as a commercial service airport that enplanes 0.05 percent to 0.25 percent of total US Passengers enplanements. The 2011-2015 NPIAS reported that there are 72 small hub airports that together account for 8% of all enplanements nationwide. The NPIAS identifies existing and proposed airports that are significant to the national air transportation system. It contains estimates of costs of airport development projects eligible for federal aid that are needed to meet aviation demand over the next five years.

Projections of short-, intermediate-, and long-term activity at the Airport that are based on 5-, 10-, and 20-year milestones (2015, 2020, and 2030) are presented in **Table 2-1**.

Table 2-1. Summary Forecast of Aviation Activity

	2010 (Actual)	2015 (Projected)	2020 (Projected)	2025 (Projected)	2030 (Projected)
Enplanements	1,592,126	1,820,148	2,177,846	2,606,377	3,119,876
Commercial Operations	52,544	56,882	65,647	75,931	98,647
General Aviation Operations	24,958	26,553	28,200	29,875	31,562
Military Operations	1,618	1,618	1,618	1,618	1,618
Total Operations	79,120	85,053	95,464	107,323	120,827
Total Freight	47,686	52,157	58,071	64,744	71,744
Based Aircraft	78	83	88	93	99

Note: Total Freight in pounds
Sources: Historical Enplanements & Freight - Airport Records
Historical Operations - Air Traffic Activity Study (ATADS)
Historical Based Aircraft Data - FAA Terminal Area Forecast Records
Projections - Mead & Hunt, Inc.

2.1 FORECASTING APPROACH

Several methods have been applied in the development of the forecasts presented in the following sections. Projections of aviation demand incorporate local and national industry trends in assessing current and future demand. Therefore, socio-economic factors such as local population and income, and employment are also analyzed for the effect they may have had on historical and future levels of activity. The comparison of relationships among these various indicators provides the initial step in the development of realistic forecasts of aviation demand. Methodologies used to develop forecasts described in this section include:

- Time-series methodologies
- Market share methodologies
- Socio-economic methodologies

2.1.1 Time Series Methodologies

Historical trend lines and linear extrapolation are widely used methods of forecasting. These techniques utilize time-series types of data and are most useful for a pattern of demand that demonstrates a historical relationship with time. Linear extrapolation establishes a linear trend by fitting a straight line using the least squares method to known historical data. Historical trend lines used in this chapter examine historical compounded annual growth rates (CAGR) and extrapolate future data values by assuming a similar compounded annual growth rate for the future.

2.1.2 Market Share Methodology

Market share, ratio, or top-down models compare local levels of activity with a larger entity. Such methodologies imply that the proportion of activity that can be assigned to the local level is a regular and predictable quantity. This method has been used extensively in the aviation industry to develop forecasts for the local level. It is most commonly used to determine the share of total national traffic activity that will be captured by a particular region or airport. Historical data is examined to determine the ratio of local airport traffic to total national traffic. The FAA develops national forecasts annually in its FAA Aerospace Forecasts document. This data source is compared with historical levels of activity reported by Spokane International Airport.

2.1.3 Socioeconomic Methodologies

Though trend line extrapolation and market share analysis may provide mathematical and formulaic justification for demand projections, there are many factors beyond historical levels of activity that may identify trends in aviation and impact on aviation demand locally. Socio-economic or correlation analysis examines the direct relationship between two or more sets of historical data. Local conditions that are examined in this chapter include population, per capita income, and total retail sales. Based upon the observed and projected correlation between historical aviation activity and the socio-economic data sets, future aviation activity projections are developed.

2.2 AIRLINE PASSENGER FORECASTS

Enplanements are defined as the activity of passengers boarding commercial service aircraft that depart an airport. Enplanements include passengers on scheduled commercial service aircraft or un-scheduled charter aircraft but not the airline crew.

Passenger enplanement data is provided to Airport management by commercial passenger service carriers, who maintain data as they transport people to and from the facility. The FAA has estimated figures on file called Terminal Area Forecasts (TAF) that are compared with the projections developed for this Master Plan.

Forecasts that are developed for airport master plans and/or federal grants must be approved by the FAA. It is the FAA's policy, listed in AC 150/5070-6B, Airport Master Plans, that FAA approval of forecasts at non-hub airports with commercial service should be consistent with the TAF. Master plan forecasts for operations, based aircraft, and enplanements are considered to be consistent with the TAF if they meet the following criteria:

a) Forecasts differ by less than 10 percent in the five-year forecast and 15 percent in the 10-year or 20-year period, or
b) Forecasts do not affect the timing or scale of an airport project, or
c) Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3, Field Formulation of the National Plan of Integrated Airport Systems.

This section examines data that pertains to passenger enplanements and describes enplanement projections in the following subsections:

- Enplanement history
- FAA TAF enplanement data and projections
- Method comparison and preferred projection methodology

Other forecasts have been examined and incorporated as part of this Master Plan Update such as the FAA Terminal Aerospace Forecasts and the Long-Term Transportation Study (LATs) conducted by the State Of Washington.

2.2.1 Enplanement History

Between 2000 and 2010, passenger enplanements at Spokane International Airport have fluctuated (see **Table 2-2**). Within this timeframe, annual passenger enplanements have increased slightly from 1,530,884 to 1,592,126 a Compounded Annual Growth Rate (CAGR) of 0.39 percent.

Table 2-2. Passenger Enplanement History

Year	Passenger Enplanements
2000	1,530,884
2001	1,441,356
2002	1,375,500
2003	1,395,268
2004	1,531,927
2005	1,600,258
2006	1,612,457
2007	1,739,883
2008	1,715,773
2009	1,527,955
2010	1,592,126
CAGR 2000-2010	*0.39%*

Notes: CAGR=Compounded Annual Growth Rate
Source: Airport Records

2.2.2 Federal Aviation Administration Forecast

The FAA records passenger enplanements for all commercial service airports and releases its Terminal Area Forecasts (TAF) annually. It should be noted that annual data are based on the fiscal year rather than the calendar year, so historical figures differ slightly from the Airport's records. The FAA's historical records and projections of passenger enplanements are shown in **Table 2-3**.

As shown in Table 2-3, the FAA projects strong, steady growth in passenger enplanements at Spokane International Airport through 2030. The TAF predicts 1,820,148 passenger enplanements in 2015, 2,177,846 in 2020, 2,606,377 in 2025, and 3,119,876 in 2030, a CAGR of 3.42 percent.

Table 2-3. FAA Passenger Enplanements Terminal Area Forecast

Year	Passenger Enplanements
2000	1,533,121
2001	1,469,518
2002	1,337,148
2003	1,362,770
2004	1,474,422
2005	1,565,505
2006	1,597,906
2007	1,689,153
2008	1,740,623
2009	1,492,710
2010	1,524,569
CAGR 2000-2010	*-0.06%*
2015	1,820,148
2020	2,177,846
2025	2,606,377
2030	3,119,876
CAGR 2010-2030	*3.42%*

Source: FAA Terminal Area Forecast May, 2011

2.2.3 Method Comparison and Preferred Projection Methodology

In all, six methodologies were employed to develop projections of passenger enplanements. These methodologies are described in the following sections:

Trend Line Methodology

The trend line methodology is based on the assumption that future trends will continue to mimic those of the selected time period and that the factors that affect those trends will continue to influence demand levels in similar fashion. The establishment of a linear trend line with historical data using the least squares methodology typically serves as a baseline projection to which other methodologies are compared.

Airport records for passenger enplanements are available from 1990 to 2010. During this time period, annual passenger enplanements increased from 808,107 to 1,592,126, a CAGR of 3.45 percent. To project future demand, a linear trend line is established using the least squares methodology and results in 1,967,035 passenger enplanements in 2015, 2,147,556 in 2020, 2,328,077 in 2025, and 2,508,597 in 2030, a CAGR of 2.39 percent (see **Table 2-4**).

Table 2-4. Passenger Enplanement Forecasts – Trend Line Methodology

Year	Passenger Enplanements
1990	808,107
1991	795,080
1992	926,838
1993	1,167,865
1994	1,345,267
1995	1,492,956
1996	1,629,620
1997	1,519,386
1998	1,472,208
1999	1,519,836
2000	1,530,884
2001	1,441,356
2002	1,375,500
2003	1,395,268
2004	1,531,927
2005	1,600,258
2006	1,612,457
2007	1,739,883
2008	1,715,773
2009	1,527,955
2010	1,592,126
CAGR 1990-2010	*3.45%*
2015	1,967,035
2020	2,147,556
2025	2,328,077
2030	2,508,597
CAGR 2010-2030	*2.30%*

Source: Airport Records, Mead and Hunt

Growth Rate Methodology

The growth rate methodology examines the percent change in activity between two points in time, and assumes that future activity will change at this rate throughout the projection period. As noted previously, there was a 3.45 percent annual increase in passenger activity between 1990 and 2010. This compound annual growth rate is applied through years 2015, 2020, 2025, and 2030 and shown in **Table 2-5**.

As shown in **Table 2-5**, the growth rate methodology projects 1,872,678 passenger enplanements in 2015, 2,218,658 in 2020, 2,628,557 in 2025, and 3,114,186 in 2030.

Table 2-5. Passenger Enplanement Forecasts - Growth Rate Methodology

Year	Passenger Enplanements	Growth Rate
1990	808,107	
1991	795,080	-1.61%
1992	926,838	16.57%
1993	1,167,865	26.01%
1994	1,345,267	15.19%
1995	1,492,956	10.98%
1996	1,629,620	9.15%
1997	1,519,386	-6.76%
1998	1,472,208	-3.11%
1999	1,519,836	3.24%
2000	1,530,884	0.73%
2001	1,441,356	-5.85%
2002	1,375,500	-4.57%
2003	1,395,268	1.44%
2004	1,531,927	9.79%
2005	1,600,258	4.46%
2006	1,612,457	0.76%
2007	1,739,883	7.90%
2008	1,715,773	-1.39%
2009	1,527,955	-10.95%
2010	1,592,126	4.20%
CAGR (1990-2010)	*3.45%*	
2015	1,872,678	3.45%
2020	2,218,658	3.45%
2025	2,628,557	3.45%
2030	3,114,186	3.45%
CAGR (2010-2030)	*3.41%*	

Source: Airport Records, Mead and Hunt

Market Share Methodology (1)

Market share methodology compares activity levels at an airport to a larger geographical region as a whole over a given length of time. For the purposes of this Master Plan, two market share methodology forecasts have been developed that compare activity at Spokane International Airport with total U.S. domestic enplanements. U.S. enplanement data are available dating to 1994. The first market share methodology applies the Airport's market share in 2010 (0.2506 percent) to projections of total U.S. domestic enplanement projections described in the FAA Aerospace Forecasts 2011-2031 (see **Table 2-6**).

Table 2-6. Passenger Enplanement Forecasts – Market Share Methodology (1)

Year	Passenger Enplanements	Total U.S. Domestic Enplanements (Millions)	GEG Market Share
1994	1,345,267	511.3	0.2631%
1995	1,492,956	531.1	0.2811%
1996	1,629,620	558.1	0.2920%
1997	1,519,386	578.3	0.2627%
1998	1,472,208	589.3	0.2498%
1999	1,519,836	610.9	0.2488%
2000	1,530,884	641.2	0.2388%
2001	1,441,356	625.8	0.2303%
2002	1,375,500	575.1	0.2392%
2003	1,395,268	587.8	0.2374%
2004	1,531,927	628.5	0.2437%
2005	1,600,258	669.5	0.2390%
2006	1,612,457	668.4	0.2412%
2007	1,739,883	690.1	0.2521%
2008	1,715,773	680.7	0.2521%
2009	1,527,955	630.8	0.2422%
2010	1,592,126	635.3	0.2506%
Average (1994-2010)			*0.2508%*
2015	1,885,841	752.5	0.2506%
2020	2,171,035	866.3	0.2506%
2025	2,420,894	966.0	0.2506%
2030	2,650,703	1,057.7	0.2506%
CAGR (2010-2030)	*2.58%*	*2.58%*	*0.2506%*

Source: Airport Records, FAA Aerospace Forecasts 2011-2031, Mead and Hunt.

As shown in Table 2-6, the first market share methodology projects 1,885,841 passenger enplanements in 2015, 2,171,035 in 2020, 2,420,894 in 2025 and 2,650,703 in 2030, a CAGR of 2.58 percent.

Market Share Methodology (2)

Between 1994 and 2010, Spokane International Airport's market share of total U.S. domestic passenger enplanements has ranged from 0.2303 percent to 0.2920 percent, with an average 0.2508 percent. The second market share methodology compares the average U.S. market share that the Airport experienced during that timeframe to total U.S. passenger enplanement projections (see **Table 2-7**).

Table 2-7. Passenger Enplanement Forecasts – Market Share Methodology (2)

Year	Passenger Enplanements	Total U.S. Domestic Enplanements (Millions)	GEG Market Share
1994	1,345,267	511.3	0.2631%
1995	1,492,956	531.1	0.2811%
1996	1,629,620	558.1	0.2920%
1997	1,519,386	578.3	0.2627%
1998	1,472,208	589.3	0.2498%
1999	1,519,836	610.9	0.2488%
2000	1,530,884	641.2	0.2388%
2001	1,441,356	625.8	0.2303%
2002	1,375,500	575.1	0.2392%
2003	1,395,268	587.8	0.2374%
2004	1,531,927	628.5	0.2437%
2005	1,600,258	669.5	0.2390%
2006	1,612,457	668.4	0.2412%
2007	1,739,883	690.1	0.2521%
2008	1,715,773	681.3	0.2519%
2009	1,527,955	631.3	0.2420%
2010	1,592,126	635.3	0.2506%
Average (1994-2010)			*0.2508%*
2015	1,887,533	752.5	0.2508%
2020	2,172,983	866.3	0.2508%
2025	2,423,066	966.0	0.2508%
2030	2,653,082	1,057.7	0.2508%
CAGR (2010-2030)	*2.59%*	*2.58%*	*0.2508%*

Source: Airport Records, Terminal Aerospace Forecasts 2010-2030, Mead and Hunt.

As shown in Table 2-7, the second market share methodology projects 1,887,533 passenger enplanements in 2015, 2,172,983 in 2020, 2,423,066 in 2025 and 2,653,082 in 2030, a CAGR of 2.59 percent.

Socioeconomic Methodology – Population Variable

Local population can be a strong indicator of commercial aviation demand, particularly at small hub and non-hub airports. The socioeconomic population variable methodology compares historical population figures to passenger enplanements. Between 2000 and 2010, the population of Spokane County increased from 427,083 to 474,627 a CAGR of 1.26 percent. Passenger enplanements increased by a CAGR of 0.39 percent during that timeframe. The average number of annual per capita enplanements from 2000-2010 was 3.493. This figure is applied to population projections provided by Woods and Poole and projects 1,764,119 passenger enplanements in 2015, 1,873,543 in 2020, 1,984,832 in 2025, and 2,096,938 in 2030, a CAGR of 1.39 percent (see **Table 2-8**).

Table 2-8. Passenger Enplanement Forecasts – Socioeconomic Methodology-Population Variable

Year	Passenger Enplanements	Spokane County Population	Enplanements Per Capita
2000	1,530,884	418,806	3.655
2001	1,441,356	422,780	3.409
2002	1,375,500	427,083	3.221
2003	1,395,268	430,991	3.237
2004	1,531,927	435,225	3.520
2005	1,600,258	440,431	3.633
2006	1,612,457	446,932	3.608
2007	1,739,883	456,004	3.815
2008	1,715,773	462,677	3.708
2009	1,527,955	468,635	3.260
2010	1,592,126	474,627	3.354
Average (2000-2010)			*3.493*
2015	1,764,119	505,051	3.493
2020	1,873,543	536,378	3.493
2025	1,984,832	568,239	3.493
2030	2,096,938	600,334	3.493
CAGR (2010-2030)	*1.39%*	*1.18%*	

Source: Airport Records, Woods & Poole, Inc. Mead and Hunt.

Socioeconomic Methodology – Income Variable

Another socioeconomic factor that was examined was local income. Local economic conditions can impact levels of passenger activity. It is assumed that one's propensity toward air travel can be partially linked with available income. Between 2000 and 2010, per capita income in Spokane County has increased from $11,804 to $14,120, a CAGR of 1.81 percent. Enplanements per $1 of income have fluctuated during this time period, therefore, the 2000-2010 average of 122.163 passenger enplanements per $1 of income is applied to income projections supplied by Woods & Poole Economics, Inc. This methodology projects 1,940,354 passenger enplanements in 2015, 2,183,984 in 2020, 2,458,364 in 2025, and 2,765,747 in 2030, a CAGR of 2.80 percent (see **Table 2-9**).

It should be noted that income figures are presented in 2004 dollars. These are "constant" dollars and are used to measure the "real" change in earnings and income when inflation is taken into account.

Table 2-9. Passenger Enplanement Forecasts – Socioeconomic Methodology-Income Variable

Year	Passenger Enplanements	Spokane County Per Capita Income ($2004)	Enplanements Per $1 Income
2000	1,530,884	$11,804	129.687
2001	1,441,356	$11,765	122.508
2002	1,375,500	$11,844	116.136
2003	1,395,268	$11,956	116.704
2004	1,531,927	$12,184	125.737
2005	1,600,258	$12,323	129.864
2006	1,612,457	$12,904	124.956
2007	1,739,883	$13,451	129.353
2008	1,715,773	$13,662	125.584
2009	1,527,955	$13,827	110.508
2010	1,592,126	$14,120	112.756
Average (2000-2010)			*123.104*
2015	1,940,354	$15,883	122.163
2020	2,183,984	$17,878	122.163
2025	2,458,364	$20,124	122.163
2030	2,765,747	$22,640	122.163
CAGR (2010-2030)	2.80%	2.39%	
Source: Airport Records, Woods & Poole, Inc. Mead and Hunt.			

Preferred Projection Methodology

A comparison of projected enplanements using the methodologies described in previous sections is shown in **Table 2-10** and **Chart 2-1**. All of the methodologies anticipate that there will be an increase in passenger demand over the next 30 years.

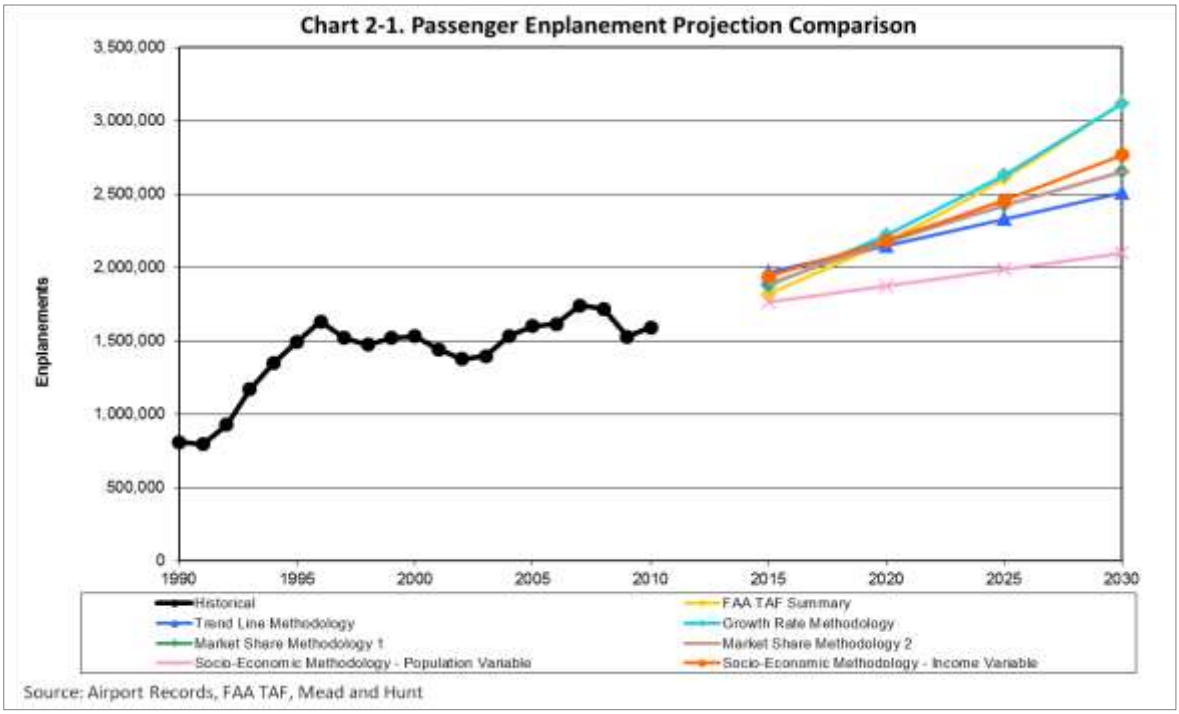
The FAA develops forecasts based on economic and political factors, as well as local, regional, and national aviation industry trends. Spokane International Airport experienced 1,739,883 passenger enplanements in 2007, an all-time record; but by 2010, enplanements at the Airport decreased by approximately nine percent. Each of the methodologies examined to project levels of passenger activity showed an increase in future enplanements, however, the recent decline in activity largely associated with national economic volatility impacts some of the formulas that are used to develop these forecasts. Many could be considered somewhat conservative when compared with projections of passenger demand developed by the FAA, therefore, the preferred forecast for passenger enplanements is the TAF.

Table 2-10. Passenger Enplanement Forecasts – Projection Comparison and Preferred Methodology

Year	Passenger Enplanements
2000	1,530,884
2001	1,441,356
2002	1,375,500
2003	1,395,268
2004	1,531,927
2005	1,600,258
2006	1,612,457
2007	1,739,883
2008	1,715,773
2009	1,527,955
2010	1,592,126
CAGR (2000-2010)	*0.39%*

Year	FAA TAF Summary	Trend Line Methodology	Growth Rate Methodology	Market Share Methodology 1	Market Share Methodology 2	Population Variable	Income Variable
2015	1,820,148	1,967,035	1,872,678	1,885,841	1,887,533	1,764,119	1,940,354
2020	2,177,846	2,147,556	2,218,658	2,171,035	2,172,983	1,873,543	2,183,984
2025	2,606,377	2,328,077	2,628,557	2,420,894	2,423,066	1,984,832	2,458,364
2030	3,119,876	2,508,597	3,114,186	2,650,703	2,653,082	2,096,938	2,765,747
CAGR (2010-2030)	*3.42%*	*2.30%*	*3.41%*	*2.58%*	*2.59%*	*1.39%*	*2.80%*

Source: Airport Records, Terminal Aerospace Forecasts 2010-2030, Woods & Poole, Inc. Mead and Hunt.



2.3 AIRCRAFT OPERATIONS FORECASTS

The following sections describe projections of aircraft operations. As with passenger enplanements, several factors are taken into account when assessing demand in both commercial and non-commercial operations. Forecasts have been developed for the following categories:

- Air Carrier Fleet Mix
- Commercial Operations
- General Aviation Operations
- Air Cargo Fleet Mix
- Air Cargo Operations
- Military Operations

2.3.1 Air Carrier Fleet Mix

National trends in aviation demand have been volatile in recent years. The events that occurred on 9/11/2001 had a significant impact on collective national travel behavior, and the economic recession that began in 2008 has resulted in fewer passenger enplanements at several airports in the U.S. With recent increases in aircraft operating costs, airlines have been forced to maximize fleet efficiency in order to remain profitable, if not sustainable.

In many markets, air carriers are reducing or retiring less fuel efficient aircraft with regional and larger jets that have more seats and lower operational costs per passenger. This trend is evident at Spokane International Airport as the average number of seats per commercial departure has increased from 96.7 in 2006 to 100.6 in 2010.

Table 2-11 presents the historical and projected scheduled passenger fleet. As shown in Table 2-11, commercial aircraft equipped with 40 or fewer seats have seen the proportion of annual operations decline from 14.2 percent to 5.1 percent during this time, while aircraft equipped with 61-99 seats have seen an increase of 29.9 percent to 40.5 percent. It is anticipated that smaller passenger aircraft use at the Airport will continue to decline throughout the projection period, resulting in a corresponding increase in larger aircraft, particularly in aircraft equipped with 100 or more seats.

Table 2-11. Scheduled Passenger Departures and Fleet Mix Projections

Seat Range	Typical Aircraft	Historical - Departures					Projected Departures			
		2006	2007	2008	2009	2010	2015	2020	2025	2030
Less than 40	Saab 340, 328Jet, ERJ 135, Beech 1900, EMB 120, DHC-8	3,063 *14.2%*	1,683 *7.0%*	1,331 *5.6%*	1,068 *5.5%*	1,078 *5.1%*	1,068 *4.7%*	954 *3.6%*	928 *3.0%*	903 *2.5%*
40-60	CRJ 200, ERJ145	1,567 *7.3%*	3,223 *13.4%*	2,960 *12.5%*	1,450 *7.4%*	1,721 *8.2%*	1,591 *7.0%*	1,564 *5.9%*	1,299 *4.2%*	903 *2.5%*
61-99	Avro RJ, CRJ 700, CRJ 900, EMB 170, EMB 175	6,436 *29.9%*	7,979 *33.1%*	8,343 *35.1%*	7,440 *38.1%*	8,510 *40.5%*	9,093 *40.0%*	10,603 *40.0%*	12,310 *39.8%*	14,299 *39.6%*
100-130	B717, DC9, EMB 190, EMB 170, A 319	1,312 *6.1%*	875 *3.6%*	1,336 *5.6%*	1,269 *6.5%*	1,124 *5.3%*	1,250 *5.5%*	1,617 *6.1%*	2,227 *7.2%*	2,889 *8.0%*
131-150	A 320, MD 80, B737-5	8,428 *39.1%*	9,268 *38.5%*	8,750 *36.8%*	7,324 *37.5%*	7,469 *35.5%*	8,365 *36.8%*	10,073 *38.0%*	12,093 *39.1%*	14,588 *40.4%*
150 or more	B 737-8, B737-9, B757	746 *3.5%*	1,072 *4.4%*	1,046 *4.4%*	966 *4.9%*	1,125 *5.4%*	1,364 *6.0%*	1,696 *6.4%*	2,072 *6.7%*	2,528 *7.0%*
Total Scheduled Passenger Departures		21,561	24,100	23,766	19,517	21,027	22,732	26,507	30,929	36,110

Source: Historical Scheduled Departures and Average Seat Data – apgData, Mead and Hunt.

2.3.2 Commercial Operations Projections

Commercial operations can be either scheduled or un-scheduled. Typically, un-scheduled commercial flights are chartered flights or air taxi flights. In recent years, the proportion of un-scheduled operations at Spokane International Airport has decreased.

Scheduled Commercial Passenger Operations Projections

As mentioned previously, airlines are trending toward using larger, more fuel efficient aircraft. In many markets, the use of larger aircraft is reducing the frequency of particular routes. Because of increasing fuel and operational costs, air carriers must maintain higher passenger load factors to remain profitable. Projections of scheduled commercial operations are based on enplanement projections described in Section 2.3. At Spokane International Airport, the average number of seats per aircraft departure is anticipated to increase from 100.6 in 2010, to 102.0 in 2015, 104.0 in 2020, 106.0 in 2025, and 108.0 in 2030. Passenger load factor is also anticipated to increase throughout the projection period, from 75.3 percent in 2010 to 78.5 percent in 2015, 79.0 percent in 2020, 79.5 percent in 2025, and 80.0 percent in 2030.

To calculate future scheduled commercial operations, the average number of seats per departure at the Airport is multiplied by the passenger load factor. Projected passenger enplanements are divided by this figure to obtain scheduled commercial passenger departures. It is assumed that the number of annual commercial departures and arrivals will be the same; therefore departures are multiplied by two to calculate projected scheduled commercial operations (see **Table 2-12**). As shown, 45,464 scheduled commercial operations are projected in 2015, 53,015 in 2020, 61,858 in 2025, and 72,219 in 2030, a CAGR of 2.74 percent.

Table 2-12. Scheduled Commercial Operations

Year	Enplanements	Scheduled Passenger Departures	Average Seats per Departure	Passenger Load Factor	Scheduled Commercial Operations
2006	1,612,457	21,561	96.7	77.4%	43,122
2007	1,739,883	24,100	97.3	74.2%	48,200
2008	1,715,773	23,766	97.9	73.8%	47,532
2009	1,527,955	19,517	101.2	77.3%	39,034
2010	1,592,126	21,027	100.6	75.3%	42,054
CAGR (2006-2010)	*-0.32%*	*-0.63%*			*-0.63%*
2015	1,820,148	22,732	102.0	78.5%	45,464
2020	2,177,846	26,507	104.0	79.0%	53,015
2025	2,606,377	30,929	106.0	79.5%	61,858
2030	3,119,876	36,110	108.0	80.0%	72,219
CAGR (2010-2030)	*3.42%*	*2.74%*			*2.74%*

Sources: Historical Enplanements - Airport Records
Historical Scheduled Air Carrier Dep's and Avg Seat Data-OAG Airline Schedules form apgDat (Oct 2010)
Projections - Mead & Hunt, Inc.

Unscheduled Commercial Passenger Operations Projections

Unscheduled flights typically fall into the charter or air taxi category. The overall proportion of nonscheduled operations at Spokane International Airport has declined from 9.3 percent in 2006 to 2.2 percent in 2010. Although the number of annual un-scheduled operations is anticipated to increase throughout the projection period, the proportion of total operations is expected to continue to decline.

Demand for un-scheduled flights can hinge on several factors and can be difficult to project. Between 2006 and 2010, annual un-scheduled operations declined from 5,487 to 1,150. According to the FAA Aerospace Forecasts 2010-2030, the projected annual growth rate of the national general aviation and air taxi fleet is expected to be 0.9 percent. It is assumed that un-scheduled operations at Spokane International Airport will reflect this national trend, therefore, this figure is applied to the 2010 level of 1,150 operations and held constant throughout the projection period (see **Table 2-13**).

Table 2-13. Unscheduled Aircraft Operations

Year	Total Commercial Operations	Un-Scheduled Operations	% Unscheduled
2006	58,879	5,487	9.3%
2007	64,206	5,986	9.3%
2008	62,672	5,274	8.4%
2009	51,819	3,477	6.7%
	52,544	1,150	2.2%
CAGR (2006-2009)		*-14.1%*	
2015	51,774	1,203	2.3%
2020	59,960	1,258	2.1%
2025	69,502	1,315	1.9%
2030	80,621	1,376	1.7%
CAGR (2009-2030)	*2.16%*	*0.90%*	

Source: Airport Records, Official Airline Guide (OAG), Air Traffic Activity Data System (ATADS), FAA Aerospace Forecasts 2011-2031, Mead and Hunt.

As shown in Table 2-13, unscheduled aircraft operations are expected to increase to 1,203 in 2015, 1,258 in 2020, 1,315 in 2025, and 1,376 in 2030.

2.4 ENPLANED/DEPLANED CARGO

Air cargo is carried by both commercial passenger service carriers and by commercial air cargo service carriers that do not have passenger service. Cargo is typically categorized as either mail or freight. The total tonnage of annual cargo at Spokane International Airport has fluctuated significantly between 1995 and 2010. However, the Airport's market share compared to total U.S. revenue ton miles has remained fairly consistent (see **Table 2-14**). During that timeframe, the Airport's market share was 0.00039 percent, which is held constant throughout the projection period. Total U.S. cargo projection data are obtained from the FAA Aerospace Forecast 2011-2031. This methodology projects 52,157 tons of annual cargo in 2015, 58,071 in 2020, 64,623 in 2025, and 71,744 in 2030, a CAGR of 2.06 percent.

Table 2-14. Forecasts of Air Cargo

Year	Total Air Cargo at GEG (tons)	Total U.S. Air Cargo (revenue ton miles)	GEG Market Share
1995	42,799.7	12,415,700,000	0.00034%
1996	48,516.9	12,781,700,000	0.00038%
1997	54,703.5	13,454,100,000	0.00041%
1998	59,281.5	13,828,100,000	0.00043%
1999	66,563.3	13,974,900,000	0.00048%
2000	67,264.3	14,698,700,000	0.00046%
2001	54,246.7	13,937,900,000	0.00039%
2002	53,274.9	12,967,400,000	0.00041%
2003	54,227.3	14,972,400,000	0.00036%
2004	57,335.9	16,340,900,000	0.00035%
2005	57,622.3	16,089,600,000	0.00036%
2006	57,369.3	15,710,500,000	0.00037%
2007	54,797.6	15,818,000,000	0.00035%
2008	52,076.2	14,410,500,000	0.00036%
2009	46,863.0	11,860,000,000	0.00040%
2010	47,686.3	12,848,000,000	0.00037%
Average Market Share % (1995-2010)			*0.00039%*
2015	52,157	13,454,000,000	0.00039%
2020	58,071	14,979,600,000	0.00039%
2025	64,623	16,669,800,000	0.00039%
2030	71,744	18,506,500,000	0.00039%
CAGR (2010-2030)	*2.06%*	*2.14%*	

Source: Airport Records, FAA Aerospace Forecasts 2011-2031, Mead and Hunt

2.5 CARGO AIRCRAFT FLEET MIX PROJECTIONS

As mentioned in Section 2.5, cargo operations at Spokane International are conducted by both passenger service and commercial cargo operators. In 2010, approximately 73 percent of air cargo operations were conducted by smaller air taxi/commuter aircraft and 27 percent by commercial air carrier aircraft. In 2010, there were 9,340 cargo operations and 47,686 tons of cargo shipped through Spokane International Airport. This equates to 5.03 tons of cargo shipped per operation. Cargo operations by aircraft type are shown in **Table 2-15**. It is assumed that per operation weight of 5.11 tons will remain constant throughout the projection period and that the proportion of operations by aircraft will also remain constant. This figure is applied to projections of total cargo at the Airport described in Section 2.5.

Table 2-15. Scheduled Air Cargo Operations

Cargo Aircraft	2010		Projected			
	Operations	%	2015	2020	2025	2030
Cessna 208 Caravan	5,907	63.2%	6,461	7,193	8,005	8,887
Beech 18 C-185	459	4.9%	502	559	622	691
ATR42	452	4.8%	494	550	613	680
Air Taxi / Commuter Total	6,818	73.0%	7,457	8,303	9,240	10,258
B757-200	28	0.3%	31	34	38	42
B767-300/300ER	142	1.5%	155	173	192	214
A300	652	7.0%	713	794	884	981
A310	1,698	18.2%	1,857	2,068	2,301	2,555
ATR72	2	0.0%	2	2	3	3
Air Carrier Total	2,522	27.0%	2,758	3,071	3,418	3,794
Grand Total	9,340		10,216	11,374	12,657	14,052
					CAGR (2010-2030)	*2.06%*
Total Cargo (Tons)	47,686		52,157	58,071	64,623	71,744
Tons/Operation	5.11		5.11	5.11	5.11	5.11

Sources: Historical Total Airport Cargo Data - Airport Management, Historical Fleet Mix - OAG Airline Schedules form apgDat, Total U.S. Air Cargo (Revenue Ton Miles) - FAA Aerospace Forecasts FY2011-2031

As shown, this methodology projects 10,216 cargo operations in 2015, 11,374 in 2020, 12,657 in 2025, and 14,052 in 2030, a CAGR of 2.06 percent.

2.6 BASED AIRCRAFT FORECASTS

There are several factors that affect the number of aircraft at an airport. The overall cost to own and operate an aircraft has increased significantly in recent years, which contributed to a slight decline in the U.S. general aviation fleet since 2007, a trend that has also occurred at Spokane International Airport. Since 1995 the number of based aircraft at the Airport has fluctuated significantly. Because of this, several methodologies were used to develop based aircraft projections.

Trend Line Methodology

The trend line methodology, which assumes that historic trends will continue in the future, projects 105 based aircraft in 2015, 107 in 2020, 109 in 2025, and 111 in 2030, a CAGR of 1.76 percent (see Table **2-16**).

Market Share Methodology

Spokane International Airport's market share of the total U.S. general aviation fleet has fluctuated by more than 65 percent between 1995 and 2010 with 2008 and 2009 experiencing the lowest market annual market shares during that timeframe. Because of this variation, the market share methodology assumes that by 2030, the Airport's market share will return to its 1995-2010 average of 0.04668 percent (see **Table 2-17**).

Table 2-16. Based Aircraft Forecasts – Trend Line Methodology

Year	Based Aircraft
1995	85
1996	85
1997	97
1998	97
1999	97
2000	97
2001	117
2002	117
2003	117
2004	107
2005	113
2006	115
2007	110
2008	77
2009	77
2010	78
CAGR (1995-2010)	*-0.57*
2015	105
2020	107
2025	109
2030	111
CAGR (2010-2030)	*1.76%*

Source: FAA TAF, Mead and Hunt

Table 2-17. Based Aircraft Forecasts – Market Share Methodology

Year	GEG Based Aircraft	Total U.S. Active Aircraft	GEG Market Share
1995	85	188,089	0.04519%
1996	85	191,129	0.04447%
1997	97	192,414	0.05041%
1998	97	204,710	0.04738%
1999	97	206,530	0.04697%
2000	97	217,533	0.04459%
2001	117	211,446	0.05533%
2002	117	211,244	0.05539%
2003	117	209,606	0.05582%
2004	107	219,319	0.04879%
2005	113	224,350	0.05037%
2006	115	221,939	0.05182%
2007	110	231,606	0.04749%
2008	77	228,668	0.03367%
2009	78	223,920	0.03439%
2010	78	224,172	0.03479
Average (1995-2010)			*0.4668%*
2015	87	229,140	0.03777%
2020	97	237,795	0.04074%
2025	110	250,560	0.04371%
2030	125	267,055	0.04668%
CAGR (2010-2030)	*2.37%*	*0.88%*	

Source: FAA TAF, FAA Aerospace Forecasts 2011-2031, Mead and Hunt.

As shown, the market share methodology projects 87 based aircraft in 2015, 97 in 2020, 110 in 2025 and 125 in 2030, a CAGR of 2.37 percent.

Socioeconomic Methodology – Income Variable

Income can often be a strong indicator of one's propensity to own an aircraft. The socioeconomic income variable methodology compares historical based aircraft at Spokane International Airport to per capita income in Spokane County. According to data obtained by Woods and Poole, Inc. per capita income in Spokane has increased from $11,804 in 2000 to $14,120 in 2010, a CAGR of 1.81 percent. During that timeframe, based aircraft per $100 income decreased by nearly 50 percent. The 2010 figure of 0.55240 based aircraft per $100 income is applied to projections of per capita income and shown in **Table 2-18**.

Table 2-18. Based Aircraft Forecasts – Socioeconomic Methodology-Income Variable

Year	Based Aircraft	Spokane County Per Capita Income ($2004)	Based Aircraft Per $100 Income
2000	97	$11,804	0.82173
2001	117	$11,765	0.99444
2002	117	$11,844	0.98785
2003	117	$11,956	0.97862
2004	107	$12,184	0.87823
2005	113	$12,323	0.91701
2006	115	$12,904	0.89118
2007	110	$13,451	0.81780
2008	77	$13,662	0.56359
2009	77	$13,827	0.56413
2010	78	$14,120	0.55240
Average (2000-2010)			*0.84145*
2015	88	$15,883	0.55240
2020	99	$17,878	0.55240
2025	111	$20,124	0.55240
2030	125	$22,640	0.55240
CAGR (2010-2030)	*2.39%*	*2.39%*	

Source: FAA TAF, Mead and Hunt. Woods & Poole, Inc.

Socioeconomic Methodology – Population Variable

The socioeconomic population variable methodology compares historical based aircraft at the Airport with the population of Spokane County. Between 2000 and 2010, the population of Spokane County increased from 418,806 to 474,627. During that same timeframe, based aircraft per capita decreased from 0.00023 to 0.00016. The 2010 figure of 0.00016 based aircraft per capita is applied to population projections of Spokane County and shown in **Table 2-19**.

Table 2-19. Based Aircraft Forecasts – Socioeconomic Methodology-Population Variable

Year	Based Aircraft	Spokane County Population	Based Aircraft Per Capita
2000	97	418,806	0.00023
2001	117	422,780	0.00028
2002	117	427,083	0.00027
2003	117	430,991	0.00027
2004	107	435,225	0.00025
2005	113	440,431	0.00026
2006	115	446,932	0.00026
2007	110	456,004	0.00024
2008	77	462,677	0.00017
2009	77	468,635	0.00016
2010	78	474,627	0.00016
Average (2000-2010)			
2015	83	505,051	0.00016
2020	88	536,378	0.00016
2025	95	568,239	0.00016
2030	99	600,334	0.00016
CAGR (2010-2030)	*1.18%*	*1.18%*	

Source: FAA TAF, Mead and Hunt. Woods & Poole, Inc.

As shown, the socioeconomic population variable methodology projects 83 based aircraft in 2015, 88 in 2020, 95 in 2025, and 99 in 2030, a CAGR of 1.18 percent.

Preferred Projection Methodology

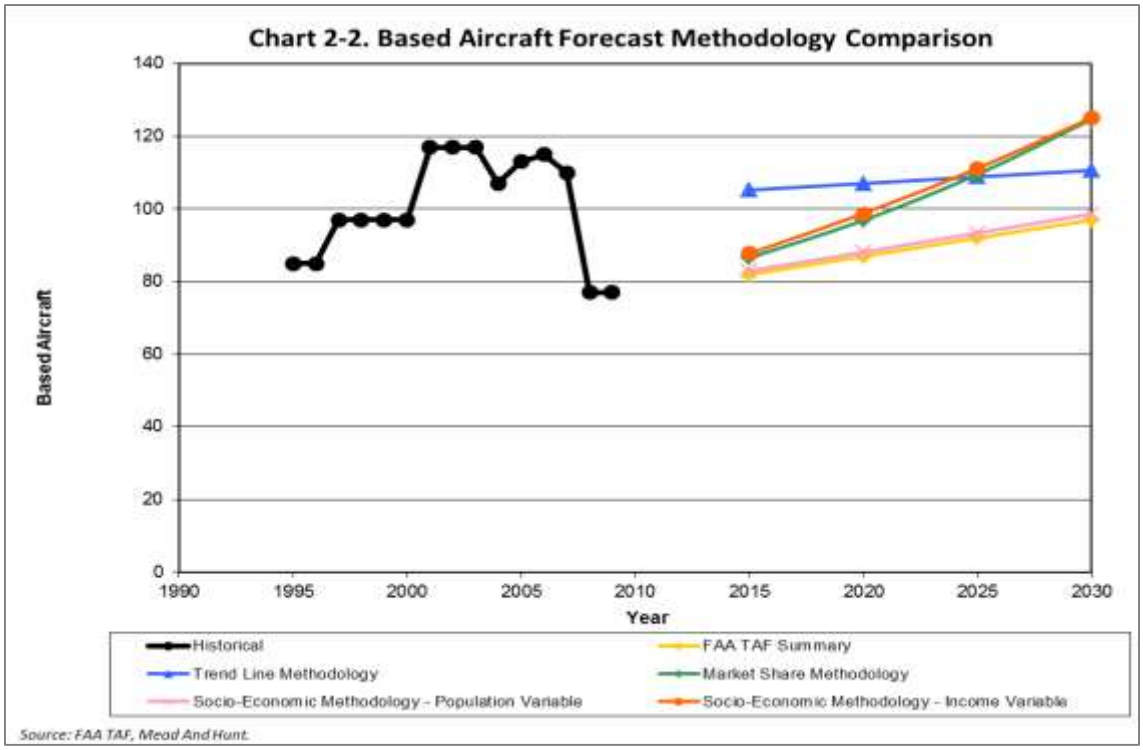
A comparison of projected based aircraft using the methodologies described in previous sections is shown in **Table 2-20** and **Chart 2-2**. All of the methodologies anticipate that there will be an increase in passenger demand over the next 30 years. Between 1995 and 2010 there was significant variation in the number of based aircraft at Spokane International Airport.

In its Terminal Aerospace Forecasts, the FAA projects that the economy will recover and that the total U.S. general aviation fleet will increase by 0.9 percent annually throughout the projection period. Increases in cost of aircraft ownership and operation, combined with the economic downturn that began in 2008 has contributed to a decrease in based aircraft at the Despite this, a slow, steady increase locally is also anticipated. As such, local demand of based aircraft is assumed to be driven by population. Therefore, the socioeconomic population variable methodology is the preferred forecast for based aircraft.

Table 2-20. Based Aircraft Forecasts – Projection Comparison and Preferred Methodology

Year	Based Aircraft	FAA TAF Summary	Trend Line Methodology	Market Share Methodology	Socioeconomic Methodology- Population Variable	Socioeconomic Methodology- Income Variable
1995	85					
1996	85					
1997	97					
1998	97					
1999	97					
2000	97					
2001	117					
2002	117					
2003	117					
2004	107					
2005	113					
2006	115					
2007	110					
2008	77					
2009	77					
2010	78					
CAGR (1995-2010)	*-0.57%*					
2015		82	105	87	83	88
2020		87	107	97	88	99
2025		92	109	110	93	111
2030		97	111	125	99	125
CAGR (2010-2030)		1.10%	1.76%	2.37%	1.18%	2.39%

Source: FAA TAF, FAA Aerospace Forecasts 2011-2031, Mead and Hunt.



2.7 BASED AIRCRAFT FLEET MIX

Historical based aircraft by type and the projected based aircraft fleet mix at Spokane International Airport is shown in **Table 2-21**. As shown, in 2010 71 percent of the local fleet was comprised of single engine aircraft, 24 percent multi-engine aircraft, and 4 percent jet aircraft. The FAA Aerospace Forecast 2011-2031 projects that jet aircraft will see the most significant growth of any type of aircraft through 2030. This is a trend that is also anticipated to occur locally as jet aircraft are expected to proportionally increase by three percent by 2030. Conversely, single engine aircraft are expected to lose four percent of the local fleet by 2030.

Table 2-21. Based Aircraft Fleet Mix Projections

Year	Single Engine		Multi Engine		Jet		Helicopter		Other		
	#	%	#	%	#	%			#	%	Total
1995	49	58%	20	24%	2	2%	3	4%	11	13%	85
1996	49	58%	20	24%	2	2%	3	4%	11	13%	85
1997	62	64%	26	27%	2	2%	2	2%	5	5%	97
1998	62	64%	26	27%	2	2%	2	2%	5	5%	97
1999	62	64%	26	27%	2	2%	2	2%	5	5%	97
2000	62	64%	26	27%	2	2%	2	2%	5	5%	97
2001	77	66%	27	23%	3	3%	3	3%	7	6%	117
2002	77	66%	27	23%	3	3%	3	3%	7	6%	117
2003	77	66%	27	23%	3	3%	3	3%	7	6%	117
2004	67	63%	33	31%	2	2%	3	3%	2	2%	107
2005	69	61%	36	32%	2	2%	3	3%	3	3%	113
2006	73	63%	37	32%	2	2%	3	3%	0	0%	115
2007	68	62%	39	35%	2	2%	1	1%	0	0%	110
2008	54	70%	19	25%	3	4%	1	1%	0	0%	77
2009	54	71%	19	24%	3	4%	1	1%	0	0%	77
2010	55	71%	19	24%	3	4%	1	1%	0	0%	77
Projected											
2015	58	70%	20	24%	4	5%	1	1%	0	0%	83
2020	62	70%	21	24%	4	5%	1	1%	0	0%	88
2025	63	68%	23	25%	6	6%	1	1%	0	0%	93
2030	66	67%	25	25%	7	7%	1	1%	0		99
CAGR (2010-2030)	*0.94%*		*1.31%*		*4.1%*		*0.00%*		*0.00%*		*1.19%*

Source: FAA TAF, FAA Aerospace Forecasts, Mead and Hunt.

2.8 GENERAL AVIATION OPERATIONS FORECASTS

General aviation operations are those which are not categorized as commercial or military. General aviation operations account for approximately 32 percent of all activity at Spokane International Airport. Since 1995, general aviation activity has declined slightly, however, between 2000 and 2010 operations have decreased by nearly 60 percent. Two methodologies were examined in determining projections of general aviation demand.

Operations per Based Aircraft Methodology

As mentioned in Section 2.7, between 2000 and 2010 the number of based aircraft at Spokane International Airport has declined. However, during the same timeframe, the number of general aviation operations has remained relatively consistent (see **Table 2-22**). The average number of annual operations per based aircraft between 2000 and 2010 was 351. This figure is applied to the projected number of based aircraft as described in Section 2.7 and results in 26,553 general aviation operations in 2015, 28,200 in 2020, 29,875 in 2025, and 31,562 in 2030, a CAGR of 1.18 percent.

Table 2-22. General Aviation Operations Forecasts – Operations Per Based Aircraft Methodology

Year	Based Aircraft	GA Operations	Operations Per Based Aircraft
2000	97	43,547	449
2001	117	43,748	374
2002	117	43,044	368
2003	117	39,808	340
2004	107	32,195	301
2005	113	36,200	320
2006	115	34,806	303
2007	110	35,961	327
2008	77	30,521	396
2009	77	27,544	358
2010	78	24,958	320
Average (2000-2010)			*351*
2015	83	26,553	351
2020	88	28,200	351
2025	93	29,875	351
2030	99	31,562	351
CAGR (2010-2030)	*1.18%*	*1.18%*	

Source: Airport Records, FAA TAF, Mead and Hunt.

Market Share Methodology

Between 2000 and 2009, Spokane International Airport's market share of total U.S. general aviation operations has declined by approximately 11 percent. Although local general aviation operations have remained relatively steady during this timeframe, itinerant operations have declined significantly. Because of this decline, the Airport's 2009 market share of 0.939 percent is applied to total the number of projected total U.S. general aviation operations described in the FAA Terminal Aerospace Forecasts 2011-2031 and shown in **Table 2-23**.

Table 2-23. General Aviation Operations Forecasts – Market Share Methodology

Year	GEG GA Operations	Total U.S. Operations	Market Share
2000	43,547	39,878,536	0.1092%
2001	43,748	37,626,472	0.1163%
2002	43,044	37,652,701	0.1143%
2003	39,808	35,524,020	0.1121%
2004	32,195	34,967,730	0.0921%
2005	36,200	34,146,832	0.1060%
2006	34,806	33,072,516	0.1052%
2007	35,961	33,131,959	0.1085%
2008	30,521	31,573,800	0.0967%
2009	27,544	27,999,600	0.0984%
2010	24,958	26,571,400	0.0939%
Average (2000-2010)			*0.1048%*
2015	25,375	27,015,000	0.0939%
2020	26,957	28,699,500	0.0939%
2025	28,662	30,515,100	0.0939%
2030	30,501	32,473,100	0.0939%
CAGR (2010-2030)	*1.01%*	*1.01%*	

Source: Airport Records, FAA Aerospace Forecast 2011-2031, Mead and Hunt.

As shown, the market share methodology projects 25,375 general aviation operations in 2015, 26,957 in 2020, 28,662 in 2025, and 30,501 in 2030, a CAGR of 1.01 percent.

Preferred Projection Methodology

General aviation activity can be affected my many variables, and the number of aircraft operations both at Spokane International Airport and in the U.S. have declined in recent years. The Airport's market share of total U.S. general aviation operations declined by approximately 10 percent between 2000 and 2010. During that same period, the number of operations per based aircraft remained relatively consistent. Therefore, the operations per based aircraft methodology is the preferred methodology (as presented in **Table 2-24**).

Table 2-24. General Aviation Operations Forecasts – Projection Comparison and Preferred Methodology

Year	GA Operations	FAA TAF Summary	Operations Per Based Aircraft Methodology	Market Share Methodology
1995	28,248			
1996	27,959			
1997	33,571			
1998	36,672			
1999	41,114			
2000	43,547			
2001	43,748			
2002	43,044			
2003	39,808			
2004	32,195			
2005	36,200			
2006	34,806			
2007	35,961			
2008	30,521			
2009	27,544			
2010	24,958			
CAGR (1995-2010)	*-0.82%*			
2015		25,318	26,553	25,375
2020		26,707	28,200	26,957
2025		28,181	29,875	28,662
2030		29,747	31,562	30,501
CAGR (2010-2030)		*0.88%*	*1.18%*	*1.01%*

Source: Airport Records, FAA TAF, FAA Aerospace Forecasts 2011-2031, Mead and Hunt.

2.9 INSTRUMENT OPERATIONS FORECASTS

Typically, instrument operations are conducted by commercial aircraft and by aircraft operating during periods of inclement weather. Between 2000 and 2010, instrument operations at Spokane International Airport increased from 67 percent of total operations to 75 percent. The 2010 figure is applied to the total number of projected operations and results in 63,642 instrument operations in 2015, 71,433 in 2020, 80,307 in 2025, and 90,411 in 2030, a CAGR of 2.14 percent (see **Table 2-25**).

Table 2-25. Instrument Operations Projections

Year	Total Operations	Instrument Operations		Visual Operations	
		Operations	%	Operations	%
2000	117,759	78,527	67%	39,232	33%
2001	110,314	74,186	67%	36,128	33%
2002	108,029	68,990	64%	39,039	36%
2003	106,100	68,427	64%	37,673	36%
2004	99,034	67,182	68%	31,852	32%
2005	99,801	67,402	68%	32,399	32%
2006	95,628	66,022	69%	29,606	31%
2007	101,323	70,581	70%	30,742	30%
2008	95,190	68,768	72%	26,422	28%
2009	81,580	56,923	70%	24,657	30%
2010	79,120	59,203	75%	19,917	25%
CAGR (2000-2010)	*-3.90%*	*-6.65%*		*-16.28%*	
2015	85,053	63,642	75%	21,410	25%
2020	95,464	71,433	75%	24,031	25%
2025	107,323	80,307	75%	27,017	25%
2030	120,827	90,411	75%	30,416	25%
CAGR (2010-2030)	*2.14%*	*2.14%*		*2.14%*	

Source: Air Traffic Activity Data System, (ATADS), Mead and Hunt.

2.10 LOCAL/ITINERANT OPERATIONS FORECASTS

Between 2000 and 2010, itinerant general aviation operations have comprised approximately 57 percent of total operations at Spokane International Airport, while local operations have accounted for approximately 43 percent of total operations. It is anticipated that this split will remain constant throughout the projection period. A summary of projected local and itinerant general aviation operations is shown in **Table 2-26**.

Table 2-26. Local/Itinerant Operations Forecasts

Year	Total GA Operations	Itinerant GA		Local GA	
		Operations	%	Operations	%
2000	43,547	27,628	63%	15,919	37%
2001	43,748	28,099	64%	15,649	36%
2002	43,044	24,579	57%	18,465	43%
2003	39,808	23,932	60%	15,876	40%
2004	32,195	19,838	62%	12,357	38%
2005	36,200	18,546	51%	17,654	49%
2006	34,806	19,132	55%	15,674	45%
2007	35,961	18,576	52%	17,385	48%
2008	30,521	16,296	53%	14,225	47%
2009	27,544	14,029	51%	13,515	49%
2010	24,958	14,121	57%	10,837	43%
Average (2000-2010)			*57%*		*43%*
2015	26,553	15,093	57%	11,459	43%
2020	28,200	16,029	57%	12,170	43%
2025	29,875	16,982	57%	12,893	43%
2030	31,562	17,941	57%	13,621	43%
CAGR (2010-2030)	*1.18%*	*1.20%*		*1.15%*	

Source: Air Traffic Activity Data System, (ATADS), Mead and Hunt.

2.11 MILITARY OPERATIONS FORECASTS

Historically, military operations have comprised approximately two percent of total operations at Spokane International Airport. It should be noted that Fairchild Air Force Base is located approximately four miles from the Airport. Between 2000 and 2010, the number of annual military operations remained fairly consistent between 1,156 and 2,529. Military operations are driven more by policy decisions than by economic conditions, therefore military operations have been projected to remain consistent at their 2010 levels (see **Table 2-27**). As Shown the number of military operations at the Airport will remain flat throughout the projection period.

Table 2-27. Military Operations Projections

Year	Total Military Operations	Itinerant		Local	
		Operations	%	Operations	%
2000	2,529	1,382	55%	1,147	45%
2001	1,966	1,289	66%	677	34%
2002	1,512	943	62%	569	38%
2003	1,868	1,120	60%	748	40%
2004	1,254	641	51%	613	49%
2005	1,567	1,123	72%	444	28%
2006	1,943	979	50%	964	50%
2007	1,156	578	50%	578	50%
2008	1,997	745	37%	1,252	63%
2009	2,217	708	32%	1,509	68%
2010	1,618	1,234	76%	384	24%
CAGR (2000-2010)					
2015	1,618	1,234	76%	384	24%
2020	1,618	1,234	76%	384	24%
2025	1,618	1,234	76%	384	24%
2030	1,618	1,234	76%	384	24%
CAGR (2010-2030)	*0.00%*	*0.00%*		*0.00%*	

Source: Air Traffic Activity Data System, (ATADS), Mead and Hunt.

2.12 PEAK PASSENGER ACTIVITY AND OPERATIONS FORECASTS

Planning for facilities and equipment requirements is often based on peak periods of passenger and aircraft activity. This section identifies monthly, daily, and hourly peaking characteristics for passenger and aircraft activity at Spokane International Airport.

2.12.1 Peak Enplanements and Passenger Activity Forecasts

Monthly passenger enplanement data were obtained from the Airport and shown in **Table 2-28**. In 2008, 2009, and 2010, the average percent of passenger enplanements that occurred in peak month accounted for 9.9 percent of total annual enplanements.

Table 2-28. Historical Peak Month Passenger Enplanements

Month	2008 Passenger Enplanements	% Annual	2009 Passenger Enplanements	% Annual	2010 Passenger Enplanements	% Annual
JAN	132,319	*7.7%*	112,666	*7.4%*	116,290	*7.2%*
FEB	133,690	*7.8%*	109,270	*7.2%*	106,078	*6.6%*
MAR	156,083	*9.1%*	134,890	*8.8%*	133,275	*7.9%*
APR	137,376	*8.0%*	113,013	*7.4%*	115,116	*7.8%*
MAY	148,245	*8.6%*	124,316	*8.1%*	127,405	*8.2%*
JUN	157,643	*9.2%*	136,699	*8.9%*	143,937	*9.2%*
JUL	168,844	*9.8%*	146,993	*9.6%*	156,860	*10.1%*
AUG	167,866	*9.8%*	147,241	*9.6%*	161,923	*9.9%*
SEP	131,771	*7.7%*	123,618	*8.1%*	134,159	*8.2%*
OCT	134,805	*7.9%*	126,338	*8.3%*	135,204	*8.3%*
NOV	120,974	*7.1%*	120,198	*7.9%*	124,059	*7.9%*
DEC	126,157	*7.4%*	132,713	*8.7%*	137,820	*8.6%*
Totals	*1,715,773*	*100.0%*	*1,527,955*	*100.0%*	*1,592,126*	*100.0%*

Source: Airport Records

It is assumed that peak monthly enplanements and deplanements will be equal, and that peak month enplanements will continue to be 9.9 percent of annual activity. This figure is applied to projections of passenger enplanements described in Section 2 and shown in **Table 2-29**.

Table 2-29. Peak Month Passenger Enplanements Forecasts

Year	Projected Annual Enplanements	Peak Month % Total	Peak Month		
			Enplanements	Deplanements	Total Activity
2015	1,820,148	9.9%	179,876	179,876	359,751
2020	2,177,846	9.9%	215,225	215,225	430,450
2025	2,606,377	9.9%	257,574	257,574	515,149
2030	3,119,876	9.9%	308,321	308,321	616,642

Source: Airport Records, Mead and Hunt.

As shown, the peak month of passenger activity (enplanements plus deplanements) is expected to reach 359,751 in 2015, 430,450 in 2020 515,149 in 2025, and 616,642 in 2030.

2.12.2 Peak Daily Passenger Activity Forecasts

It should be noted that planning for facility and equipment requirements is based on the probable demand that may occur over time. Therefore, if planning is contingent on the absolute busiest periods of activity, it can lead to overestimation, overspending, and inefficiencies. Daily peak activity figures are based on a typical weekday during the peak month.

The average weekday during the peak month for passenger activity typically sees 64 commercial departures and 64 arrivals. These account for approximately 14.9 percent of available weekly seats either departing or arriving at the Airport (see **Table 2-30**).

Table 2-30. Peak Month Daily Activity

Day	Departures	Departing Seats	% Weekly Total	Arrivals	Arriving Seats	% Weekly Total
Mon	64	6,521	14.93%	64	6,521	14.92%
Tue	64	6,501	14.88%	64	6,519	14.92%
Wed	64	6,482	14.84%	64	6,464	14.79%
Thu	64	6,501	14.88%	64	6,501	14.88%
Fri	64	6,464	14.80%	64	6,464	14.79%
Sat	51	5,182	11.86%	52	5,270	12.06%
Sun	61	6,030	13.80%	54	5,960	13.64%
Total	*432*	*43,681*		*426*	*43,699*	

Sources: Official Airline Guide (OAG) August, 2010 Schedule, Mead and Hunt.

It is assumed that the average peak month is 31 days long (4.4 weeks). Peak month enplanements/deplanements are divided by the average number of weeks in the peak month to determine the average number of weekly passenger enplanements/deplanements that occur in the peak month. This figure is divided by the percent of weekly activity that occurs on a typical weekday and results in the average number of daily enplanements/deplanements that occurs in the peak month (see **Table 2-31**).

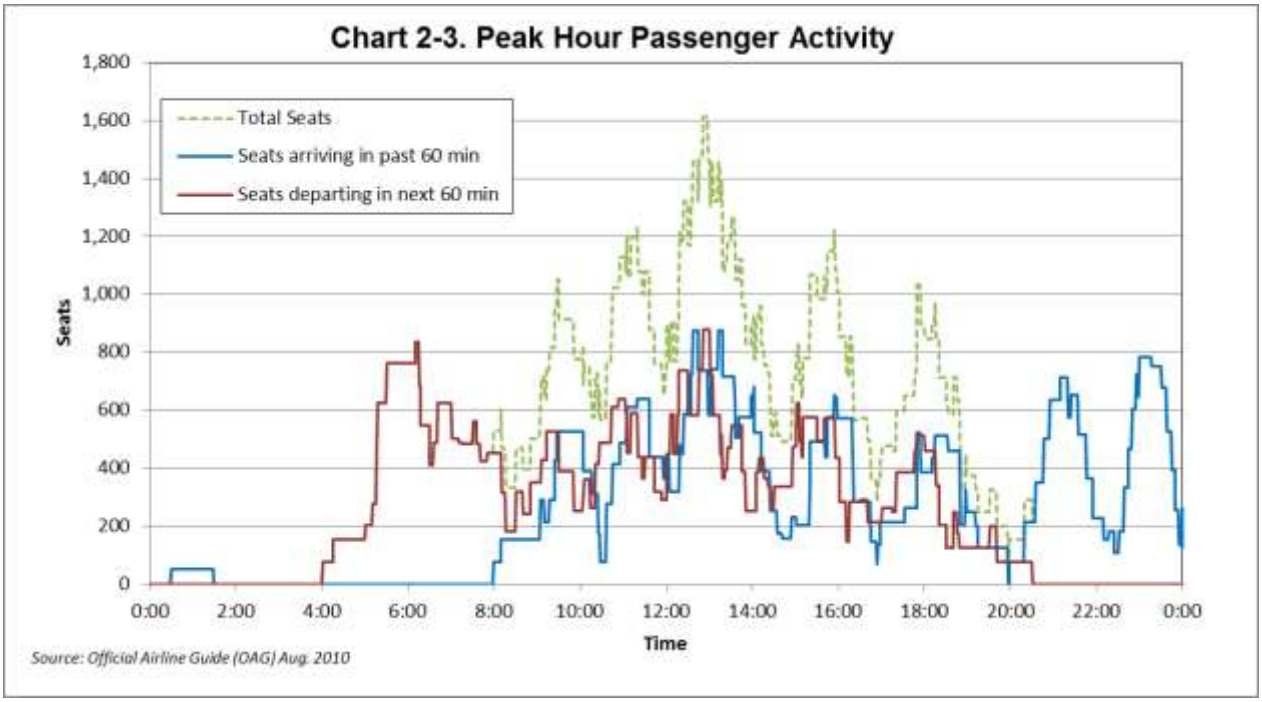
Table 2-31. Peak Month Average Day Passenger Activity

Year	Peak Month Enpl/Depl	Weeks in Peak Month	Average Weekly Enpl/Depl	% of Weekly Activity on Typical Weekday		Average Weekday Passengers		
				Enplaning	Deplaning	Enplanements	Deplanements	Total
2010	161,923	4.4	36,801	14.88%	14.87%	5,477	5,475	10,952
2015	179,876	4.4	40,881	14.88%	14.87%	6,084	6,082	12,166
2020	215,225	4.4	48,599	14.88%	14.87%	7,233	7,230	14,463
2025	257,574	4.4	58,162	14.88%	14.87%	8,656	8,653	17,309
2030	308,321	4.4	69,621	14.88%	14.87%	10,362	10,357	20,719

Sources: Airport Records, Official Airline Guide (OAG) August, 2010 Schedule, Mead and Hunt.

2.12.3 Peak Hourly Passenger Activity Forecasts

The number of hourly arriving and departing seats during a typical weekday in the peak month is shown in **Chart 2-3**.



Typically, peak hourly departing seats occurs between 1:00pm and 2:00pm, peak hourly arriving seats occurs between 12:15pm and 1:15pm, and peak total arriving and departing seats occurs between approximately 12:50pm and 2:00pm (see **Table 2-32**).

Table 2-32. Peak Hour Seats

Time of Day	# of Seats	Total Daily Seats	% of Daily Seats in Peak Hour
Peak Hour Departing Seats (Enplanements)			
13:00 to 14:00	878	6,482	13.5%
Peak Hour Arriving Seats (Deplanements)			
12:15 to 13:15	875	6,464	13.5%
Peak Total Passengers			
12:50 to 13:00	1,614	12,946	12.5%

Sources: Official Airline Guide (OAG) August, 2010 Schedule, Mead and Hunt.

The percentage of daily seats during peak hour is applied to the average daily passenger figures described in Section 2.1.12, and shown in **Table 2-33**.

Table 2-33. Peak Hour Passenger Activity					
Year	Average Day Passengers		Peak Hour Passengers		
	Enplanements	Deplanements	Enplanements	Deplanements	Total Passengers
			13.5%	13.5%	12.5%
2010	5,477	5,475	742	741	1,365
2015	6,084	6,082	824	823	1,517
2020	7,233	7,230	980	979	1,803
2025	8,656	8,653	1,172	1,171	2,158
2030	10,362	10,357	1,403	1,402	2,583
Sources: Airport Records, Official Airline Guide (OAG) August, 2010 Schedule, Mead and Hunt.					

2.12.4 Passenger Activity Peaking Characteristics Summary

A summary of peaking characteristics described in the previous sections is described in **Table 2-34**.

Table 2-34. Peaking Characteristics Summary				
Year	Peak Factor	Enplanements	Deplanements	Total Passenger Activity
2010	**Actual**			
	Annual	1,592,126	1,592,126	3,184,252
	Peak Month	161,923	161,923	323,846
	Peak Month Avg. Weekday	5,477	5,475	10,952
	Peak Hour Avg. Weekday	742	741	1,483
2015	**Projected**			
	Annual	1,820,148	1,820,148	3,640,296
	Peak Month	179,876	179,876	359,751
	Peak Month Avg. Weekday	6,084	6,082	12,166
	Peak Hour Avg. Weekday	824	823	1,647
2020	**Projected**			
	Annual	2,177,846	2,177,846	4,355,692
	Peak Month	215,225	215,225	430,450
	Peak Month Avg. Weekday	7,233	7,230	14,463
	Peak Hour Avg. Weekday	980	979	1,958
2025	**Projected**			
	Annual	2,606,377	2,606,377	5,212,754
	Peak Month	257,574	257,574	515,149
	Peak Month Avg. Weekday	8,656	8,653	17,309
	Peak Hour Avg. Weekday	1,172	1,171	2,344
2030	**Projected**			
	Annual	3,119,876	3,119,876	6,239,752
	Peak Month	308,321	308,321	616,642
	Peak Month Avg. Weekday	10,362	10,357	20,719
	Peak Hour Avg. Weekday	1,403	1,402	2,806
Sources: Airport Records, Official Airline Guide (OAG) August, 2010 Schedule, Mead and Hunt.				

2.12.5 Peak Operations Forecasts

Historical monthly operations are shown in **Table 2-35**. In 2008 and 2009, the peak month accounted for an average of approximately 9.7 percent of total operations at Spokane International Airport.

Table 2-35. Historical Peak Month Aircraft Operations

Month	2008 Aircraft Operations	% Annual	2009 Aircraft Operations	% Annual	2010 Aircraft Operations	% Annual
Jan	7,262	*7.7%*	6,007	*7.4%*	5,840	*7.2%*
Feb	7,399	*7.8%*	5,687	*7.0%*	5,489	*6.7%*
Mar	7,880	*8.3%*	7,078	*8.7%*	6,491	*8.0%*
Apr	8,662	*9.1%*	7,671	*9.4%*	6,388	*7.8%*
May	9,069	*9.6%*	7,526	*9.2%*	7,087	*8.7%*
Jun	9,366	*9.9%*	7,450	*9.2%*	7,086	*8.7%*
Jul	9,460	*10.0%*	7,246	*8.9%*	7,405	*9.1%*
Aug	8,207	*8.7%*	6,831	*8.4%*	7,284	*8.9%*
Sep	7,640	*8.1%*	7,144	*8.8%*	7,402	*9.1%*
Oct	8,231	*8.7%*	6,914	*8.5%*	7,130	*8.8%*
Nov	5,888	*6.2%*	5,674	*7.0%*	5,555	*6.8%*
Dec	5,647	*6.0%*	6,169	*7.6%*	5,963	*7.3%*
Totals	*94,711*	*100.0%*	81,397	*100.0%*	79,120	*7.2%*

Source: Air Traffic Activity Data System, (ATADS), Mead and Hunt.

To project peak month operations, the 9.59 percent 2008-2010 peak month average of total operations is applied to annual operations projections described in previous sections of this document. That figure is divided by the number of days in the peak month, 31, to determine the average number of daily operations in peak month. July was the peak month for aircraft operations in 2010, which was primarily fueled by an increase in general aviation and military operations compared with other months. The FAA Enhanced Traffic Management System Counts (ETMSC) database notes that the average number of aircraft operations in the peak hour for each individual day in July was 10.98 percent of the total daily operations. This figure is applied to the average number of projected daily operations in peak month to project peak hour operations (see **Table 2-36**).

Table 2-36. Peak Aircraft Operations Forecasts

Year	Annual Operations	Peak Month %	Peak Month Operations	Peak Month Avg. Day Operations	Peak Hour %	Peak Hour Operations
2015	85,053	9.59%	8,157	263	10.98%	29
2020	95,464	9.59%	9,156	295	10.98%	32
2025	107,323	9.59%	10,293	332	10.98%	36
2030	120,827	9.59%	11,588	374	10.98%	41
CAGR (2009-2030)	*2.04%*		*2.26%*	*2.10%*		*1.82%*

Sources: Airport Records, Official Airline Guide (OAG) August, 2010 Schedule, FAA Enhanced Traffic Management Systems Counts (ETMSC), Mead and Hunt.

2.13 FORECAST SUMMARY AND FAA TAF COMPARISON

Passenger and aircraft activity at the Spokane International Airport has fluctuated in recent history. This is not an uncommon theme at many U.S. airports as economic uncertainty and increased travel costs have impacted travel behavior. Despite rapid increases in fuel cost, airline bankruptcies, system-wide route restructuring, and aircraft fleet overhauls, the forecasts developed for this Master Plan Update suggest positive growth in passenger enplanements, the number of based aircraft, and total aircraft operations at the Airport over the next 20 years.

The FAA templates for summarizing and documenting airport planning forecasts and for comparing projections with the FAA TAF Forecasts are presented in **Tables 2-37** and **Table 2-38**.

Table 2-37. FAA Template for Summarizing and Documenting Airport Planning Forecasts

A. Forecast Levels and Growth Rates

	Specify base year: 2009								
	2010	**2015**	**2020**	**2025**	**2030**	**Average CAGR**			
	Base Yr. Level	**Base Yr. + 5yr.**	**Base Yr. + 10yrs.**	**Base Yr. + 15yrs.**	**Base Yr. + 20yrs.**	**Base Yr. + 5yr.**	**Base Yr. + 10yrs.**	**Base Yr. + 15yrs.**	**Base Yr. + 20yrs.**
Passenger Enplanements									
TOTAL Air Carrier & Commuter	1,592,126	1,820,148	2,177,846	2,606,377	3,119,876	2.3%	2.9%	3.1%	3.3%
Operations									
Itinerant									
Air carrier	38,976	45,464	53,015	61,858	72,219	2.6%	2.8%	2.9%	3.0%
Commuter/air taxi	13,568	11,418	12,632	13,973	15,428	-2.8%	-0.6%	0.2%	0.6%
Total Commercial Operations	52,544	56,882	65,647	75,831	87,647	1.3%	2.0%	2.3%	2.5%
General aviation	14,121	15,093	16,029	16,982	17,941	1.1%	1.2%	1.2%	1.1%
Military	1,234	1,234	1,234	1,234	1,234	0.0%	0.0%	0.0%	0.0%
Local									
General aviation	10,837	11,459	12,170	12,893	13,621	0.9%	1.1%	1.1%	1.1%
Military	384	384	384	384	384	0.0%	0.0%	0.0%	0.0%
TOTAL OPERATIONS	79,120	85,053	95,464	107,323	120,827	1.2%	1.7%	1.9%	2.0%
Instrument Operations	59,203	63,642	71,433	80,307	90,411	1.2%	1.7%	1.9%	2.0%
Peak Hour Operations	28	29	32	36	41	0.5%	1.3%	1.6%	1.8%
Cargo/mail (enplaned+deplaned tons)	47,686	52,157	58,071	64,623	71,744	1.5%	1.8%	1.9%	2.0%
Based Aircraft									
Single Engine (Nonjet)	55	58	62	63	66	0.9%	1.0%	0.9%	0.9%
Multi Engine (Nonjet)	19	20	21	23	25	0.8%	1.0%	1.3%	1.2%
Jet Engine	3	4	4	6	7	5.6%	3.6%	4.0%	4.0%
Helicopter	1	1	1	1	1	0.0%	0.0%	0.0%	0.0%
Other	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
TOTAL	78	83	88	93	99	1.0%	1.1%	1.1%	1.1%

B. Operational Factors

	Base Yr. Level	**Base Yr. + 5yr.**	**Base Yr. + 10yrs.**	**Base Yr. + 15yrs.**	**Base Yr. + 20yrs.**
Average aircraft size (seats)					
Air carrier & Commuter	100.6	102.0	104.0	106.0	108.0
Average enplaning load factor					
Air carrier & Commuter	75.3%	78.5%	79.0%	79.5%	80.0%
GA operations per based aircraft	320	320	320	320	320

CAGR = Compound Annual Growth Rate

Table 2-38. FAA Template for Comparing Airport Planning and TAF Forecasts

	Year	Airport Forecast	TAF	AF/TAF (% Difference)
Passenger Enplanements				
Base Yr. Level	2010	1,592,126	1,524,569	4.4%
Base Yr. + 5yr.	2015	1,820,148	1,820,148	0.0%
Base Yr. + 10yrs.	2020	2,177,846	2,177,846	0.0%
Base Yr. + 15yrs.	2025	2,606,377	2,606,377	0.0%
Base Yr. + 20yrs.	2030	3,119,876	3,119,876	0.0%
Commercial Operations				
Base Yr. Level	2010	52,544	52,078	0.9%
Base Yr. + 5yr.	2015	56,882	59,618	-4.6%
Base Yr. + 10yrs.	2020	65,647	67,568	-2.8%
Base Yr. + 15yrs.	2025	75,831	76,588	-1.0%
Base Yr. + 20yrs.	2030	87,647	86,834	0.9%
Total Operations				
Base Yr. Level	2010	79,120	79,229	-0.1%
Base Yr. + 5yr.	2015	85,053	86,405	-1.6%
Base Yr. + 10yrs.	2020	95,464	95,744	-0.3%
Base Yr. + 15yrs.	2025	107,323	106,238	1.0%
Base Yr. + 20yrs.	2030	120,827	118,050	2.4%

NOTES: TAF data is on a U.S. Government fiscal year basis (October through September).
Airport Forecast is on a calendar year basis.

2.14 50-YEAR FORECAST

The 50-year forecast of projected demand takes the preferred forecasts and projects them out to 2050 using the straight-line growth methodology. There are several assumptions going in to the 50-year forecasts including how GEG will have the facilities in place to meet the expected demand, and that market conditions will not impact the demand for air travel in a substantially different way than they do today. The 50-year forecast is presented in **Table 2-39**.

Table 2-39. Summary Forecast of Aviation Activity - 50 Year Forecast

	2010 (Actual)	2015 (Projected)	2020 (Projected)	2025 (Projected)	2030 (Projected)	2050 (Projected)
Enplanements	1,592,126	1,820,148	2,177,846	2,606,377	3,119,876	8,558,097
Commercial Operations	52,544	56,882	65,647	75,931	98,647	253,761
General Aviation Operations	24,958	26,553	28,200	29,875	31,562	44,885
Military Operations	1,618	1,618	1,618	1,618	1,618	1,618
Total Operations	79,120	85,053	95,464	107,323	120,827	300,264
Total Freight	47,686	52,157	58,071	64,744	71,744	132,397
Based Aircraft	78	83	88	93	99	142

Note: Total Freight in pounds

Sources: Historical Enplanements & Freight - Airport Records

1. Historical Operations - Air Traffic Activity Study (ATADS)

2. Historical Based Aircraft Data - FAA Terminal Area Forecast Records

3. Projections - Mead & Hunt, Inc.

Methodology for evaluating airfield capacity and delay is discussed in **Chapter 3**. The existing airfield at GEG has an annual service volume of 215,000 operations. AC 150/5060-5 shows that the ultimate configuration of GEG with two parallel runways (or two parallel with a crosswind) will have an airfield capacity of 305,000 operations, assuming that the fleet mix remains similar. The 50-year projection – which forecasts for unconstrained growth (not impacted by other influences such as gate space, passenger demand, and airline business decisions/aircraft choice) anticipates 300,264 operations in 2050. This will put GEG at near capacity, but not over capacity.

50-year forecast projections should be viewed with caution as there are so many unknowns that can influence actual demand. Navigation technologies, such as required navigation performance, can reduce separation minimums and increase capacity. The FAA's NextGen initiative includes a shift away from ground-based radio technologies and transitions aircraft navigation technologies to GPS satellites. This shift is expected to improve airport capacity as pilots and controllers operate with improved situational awareness.

It is likely that the ultimate airport configuration, combined with improved navigation technologies, will increase GEG's capacity beyond what is indicated in AC 150/5060-5. This AC was written in 1983 and is in the process of being updated. Considering the risks associated with the accuracy of 50-year year projections and the many unknowns about technologies and socioeconomic conditions in the future, and that the 50-year projection places GEG close to ASV with the ultimate airfield configuration, it would be prudent to assume that GEG will likely be able to accommodate the 50-year demand using the ultimate runway configuration.

The 50-year forecast demonstrates that the ultimate airfield configuration will provide sufficient capacity for aviation growth at GEG. It is not expected that additional property will be needed to enhance airfield capacity. Property releases that do not impacted planned pavement, NAVAID, and building development will likely not reduce future capacity at GEG.

CHAPTER 3

Airside Facilities

3.0 AIRSIDE OVERVIEW

This chapter focuses on airside facilities at Spokane International Airport (GEG or "the Airport"). Airside facilities include runways, taxiways, support facilities, and non-terminal building areas. Airside facility planning is largely driven by criteria and standards developed by the Federal Aviation Administration (FAA) that emphasize safety and efficiency while protecting federal investment in airport transportation infrastructure. This chapter begins with an assessment of the runway system and airport geometry, and then evaluates the taxiway system, airside support facilities, and development areas. The chapter concludes with an assessment of real property: land needed to support aviation-related development and surplus land which may accommodate compatible non-aviation uses.

Two major airside projects have been completed since the 2003 Master Plan (2003 Plan). In 2010, Runway 3/21 was extended 2,000 feet to the southwest. In 2011, the northern portion of Runway 3/21 was re-graded and reconstructed to meet FAA standards for providing a clear line of sight between the runway ends. Analysis indicates that the airside environment is compliant with FAA design standards; therefore, airside improvement priorities will focus on near-term taxiway system improvements and accommodating growth in the demand for Maintenance Repair and Overhaul (MRO) facilities. Longer-term improvements relate to the runway system. These improvements consider alignment of a new runway on the west side of the Airport, and a phasing strategy for new runway implementation that considers adding or replacing runways at GEG. Airfield capacity influences the evaluation of runway alignment and construction phasing; therefore, a discussion of airfield capacity at GEG is presented in the following section.

3.1 AIRFIELD CAPACITY

Airfield capacity is the number of aircraft operations the runway and taxiway system can accommodate before delays frequently occur, and does not refer the size or weight of an aircraft that can use the Airport. Airports that operate over capacity are generally less efficient and have higher operating costs. This section evaluates capacity, delay, and airfield geometry at GEG, and establishes trigger points for comprehensive planning and implementation of a new runway to increase airfield capacity.

3.1.1 Factors that Influence Capacity

There are many variables that influence airport capacity. Some are independent and some are interrelated. The most significant variables are summarized below.

Visual versus instrument flight conditions—Runway capacity is higher during visual flight conditions (high visibility) than it is during instrument flight conditions (low visibility). In visual flight conditions, pilots can operate closer to other aircraft, and fly shorter flight segments around the Airport. During visual flight conditions, airport capacity is limited by runway occupancy time. Aircraft attempt to exit the runway as quickly as possible to avoid delaying the aircraft following them. Wake turbulence from larger aircraft may also cause delay during visual conditions as smaller aircraft must wait longer than normal when a large aircraft departs before them. During instrument flight conditions, aircraft must maintain additional distance from each other, which reduces airfield capacity. Controllers use radar and predictive tools to meet aircraft separation requirements. Controllers may be unable to see the aircraft on the ground during instrument flight conditions. Aircraft taxi at a slower speed when the controllers are unable to see them. Slower taxi speeds increases runway and taxiway occupancy times, which reduces airfield capacity and increases delays. There are technological enhancements that can improve safety and situational awareness in the air and on the ground during instrument visual conditions, reducing the impact of low visibility conditions on airport operations.

Operating dependencies—Runways that have overlapping arrival and departure corridors are dependent on each other, while runways that are parallel with each other have fewer dependencies. Aircraft operating on one runway must consider aircraft operating on the other runway, which can cause delay for one aircraft if both wish to operate simultaneously. The two intersecting runways at GEG are dependent, as are flight operations at GEG and Fairchild Air Force Base (FAFB), located five miles west of GEG. The extended centerline of GEG Runway 7/25 crosses over FAFB. The close proximity and converging runway alignments of GEG and FAFB require a high level of air traffic controller coordination. When aircraft are arriving from the north and departing to the south, arrivals into both facilities converge in the final approach area to GEG Runway End 21. When aircraft are arriving from the south and departing to the north, air traffic controllers protect for missed approaches to FAFB Runway End 5. The airfield proximity and converging traffic patterns of GEG and FAFB are shown in **Figure 3-1.**

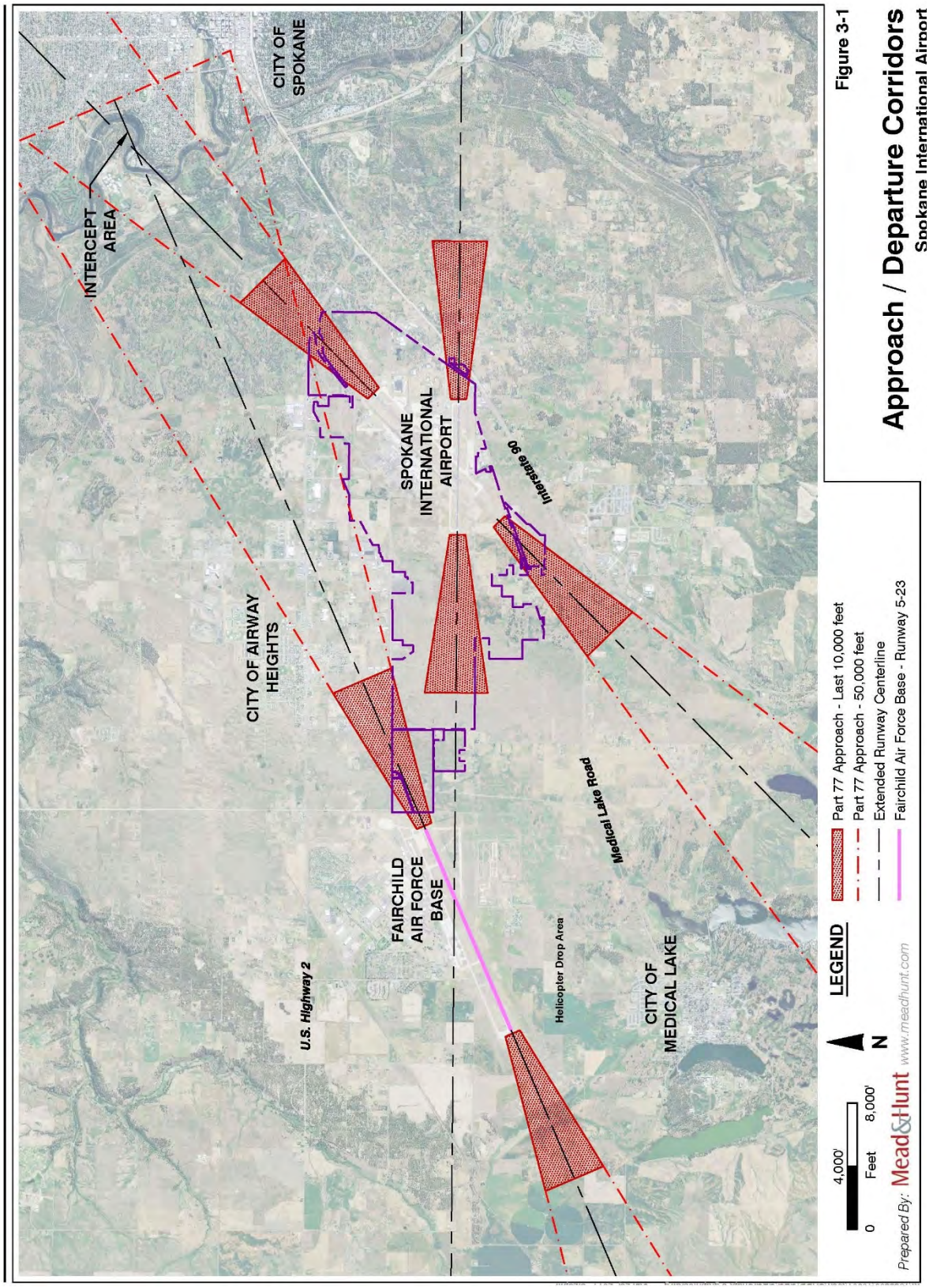


Figure 3-1
Approach / Departure Corridors
Spokane International Airport

Aircraft operating mix—Differences between aircraft size and speed affect airfield capacity. A more diverse operating mix can reduce capacity as slower aircraft may require a faster aircraft coming in after them to slow down or otherwise maneuver to maintain separation. Lighter aircraft need to avoid the wake turbulence generated by heavier ones. Secondary runways can be helpful in separating the larger aircraft from smaller aircraft, which produces a more even flow rate and reduces unnecessary delay.

Operating flow pattern—Wind determines the direction of takeoff and landing at an airport. Airports often have two or more "flow patterns" to account for different wind, weather, and demand combinations. Each pattern has its own unique set of operating efficiencies and dependencies.

Parallel runway separation—Parallel runways separated by less than 4,300 feet are not entirely independent of each other due to concern of wake turbulence. Light winds may push the wake turbulence across the parallel runway or flight path. The degree of dependency between the runways is affected by the amount of lateral separation and runway end stagger.

3.1.2 Capacity / Delay Measures

Quantifying airport capacity and delay can be simplified by averaging the variables to create typical operating conditions experienced over the course of a year. An airport's annual capacity is known as the Annual Service Volume (ASV), which is the number of flight operations an airfield can accommodate during the course of a year. Annual demand, existing or forecast, is compared with the ASV to determine what percent of capacity the airport is operating at, and to gauge the timing of airfield capacity improvements. As annual demand approaches ASV, average delays will increase. A typical goal is to construct a new runway by the time delays average 10 to 15 minutes per operation. This requires planning, environmental, and design work to be completed before delays reach this threshold.

In 2009, GEG completed a Third Runway Study, included in Appendix A, which assessed two runway alignment alternatives. At the same time, the FAA Capacity Branch assessed traffic flow, capacity and delay using an airfield capacity simulation model (SIMMOD), included in Appendix B. The studies determined that GEG has an ASV of 215,000 annual operations. It is expected that average delay will be 15 minutes per operation when GEG reaches this level of annual operations if improvements are not made to the airfield. The ASV has been verified using the capacity and delay calculations for long range planning contained in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

3.1.3 Third Runway Trigger Points

New runway implementation generally requires a 10 year lead time to work through the planning, environmental, design, and construction processes. Operational trigger points from which to launch planning initiatives and implement activity are identified so that the runway will open before delays become unmanageable. The triggering mechanism provides the flexibility necessary should demand increase more rapidly or more slowly than forecast. Planning guidelines recommend initiating runway planning when actual aircraft operations reach 60% of the ASV, which is 129,000 annual operations at GEG. Runway construction should begin when aircraft operations reach 80% of the ASV, which is 172,000 annual operations at GEG.

Figure 3-2 provides an indication of the average delays to be expected as demand increases. It also illustrates the annual aircraft operations and percent of ASV trigger points to initiate planning and construction of a parallel runway. **Figure 3-3** shows that based on the capacity of the existing runway system configuration, the need to initiate planning of a future runway is beyond the 20-year planning horizon of this master plan. New technologies associated with the FAA NextGen program may increase the ASV in the future by increasing the throughput during instrument conditions and defer implementation of a new runway.

Figure 3-2. Capacity and Delay

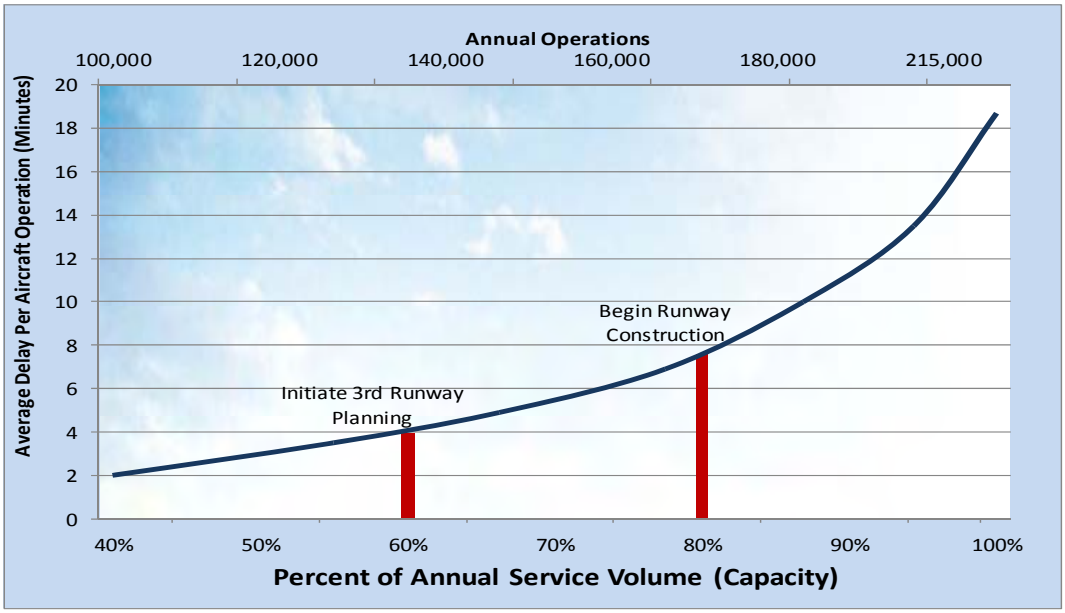
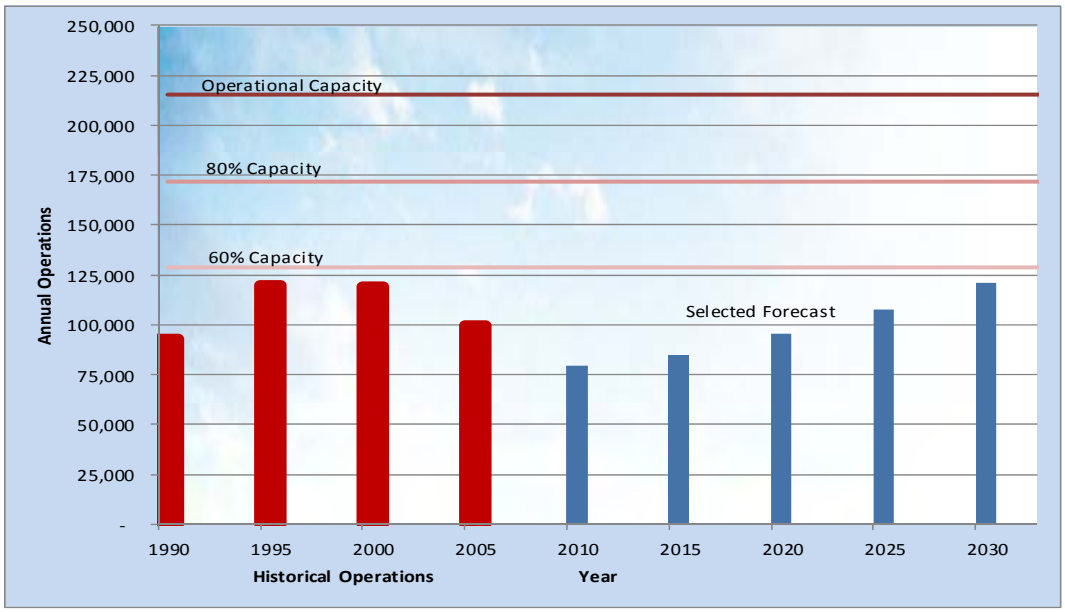


Figure 3-3. Operations and Capacity



3.1.4 Capacity Recommendations

In 2013, aircraft operations at GEG did not routinely experience excessive delays; however, it is expected delays will increase as operations increase, becoming exponentially worse as the Airport nears ASV. The most effective means of adding capacity and combatting delay is to add an independent arrival and departure stream by constructing a parallel runway. GEG has been proactive in planning for a new runway for over 30 years, acquiring properties on which to construct the runway, and monitoring land uses in the future arrival and departure corridors. Forecasted aircraft operations are not expected to trigger the need to initiate construction of a new runway during the 20-year planning horizon. The Airport desires to continue the protecting and planning for a new runway in this location.

3.1.5 Airspace Compatibility

Implementation of Runway 3L/21R will put GEG traffic closer to aircraft operating at Fairchild Air Force Base. It is recommended that the Airport, FAA air traffic control, and Fairchild officials develop a resolution to solve potential airspace conflicts prior to construction of Runway 3L/21R.

3.2 FUNDAMENTALS OF AIRPORT DESIGN

Planning and development of airside facilities is heavily predicated on complying with the FAA design standards in AC 150/5300-13A, *Airport Design* (5300-13A). This section summarizes the design standards contained 5300-13A, and identifies the conditions unique to GEG that influence design recommendations.

3.2.1 Design Standards Concept and Terminology

The FAA is responsible for the overall safety of civil aviation in the United States (U.S.); therefore, FAA design standards are primarily driven by safety. Secondary goals including efficiency and utility are also reflected in FAA standards and policy. Changes affecting safety and efficiency are constantly evolving as the aviation industry continues its rapid development, and it is expected that design standards will continue to evolve with technologies and procedures.

Design Aircraft

FAA design standards for an airport are determined by a coding system that relates the physical and operational characteristics of an aircraft to the design and safety setback distances of the airfield facility. The design aircraft is the most demanding aircraft operating or forecast to operate at that facility on a regular basis, which the FAA defines as an aircraft with scheduled operations, or a non-scheduled aircraft with more than 500 or more operations per year. Characteristics of the design aircraft that are used in facility planning include approach speed, wingspan, tail height, main gear width, cockpit to main gear length, aircraft weight, and takeoff and landing distances. Dimensions of airfield facilities determined by the design aircraft include: runways, taxiways, taxilanes, and aprons, and associated setbacks and clearances. The design aircraft may be a specific aircraft type, or a composite of aircraft characteristics.

Runway Design Code (RDC)

The RDC is three-component code that defines the applicable design standards that apply to a specific runway. The first component, depicted by a letter (A-E) is the Aircraft Approach Category (AAC), and relates to the approach speed of the design aircraft. The second component, Airplane Design Group (ADG), depicted by a Roman numeral (I-VI), relates to the greatest wingspan or tail height of the design aircraft. The third component relates to runway visibility minimums as expressed in Runway Visual Range (RVR) equipment measurements. RVR-derived values represent feet of forward visibility that have statute mile equivalents (e.g. 2400 RVR = ½-mile). RDC classifications are summarized in **Table 3-1**.

Table 3-1. Runway Design Code System

Aircraft Approach Category (AAC)	
AAC	**Approach Speed**
A	Approach Speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

Airplane Design Group (ADG)		
Group #	**Tail height (ft)**	**Wingspan (ft)**
I	< 20’	< 49’
II	20’ - < 30’	49’ - < 79’
III	30’ - < 45’	79’ - < 118’
IV	45’ - < 60’	118’ - < 171’
V	60’ - < 66’	171’ - < 214’
IV	66’ - < 80’	214’ - < 262’

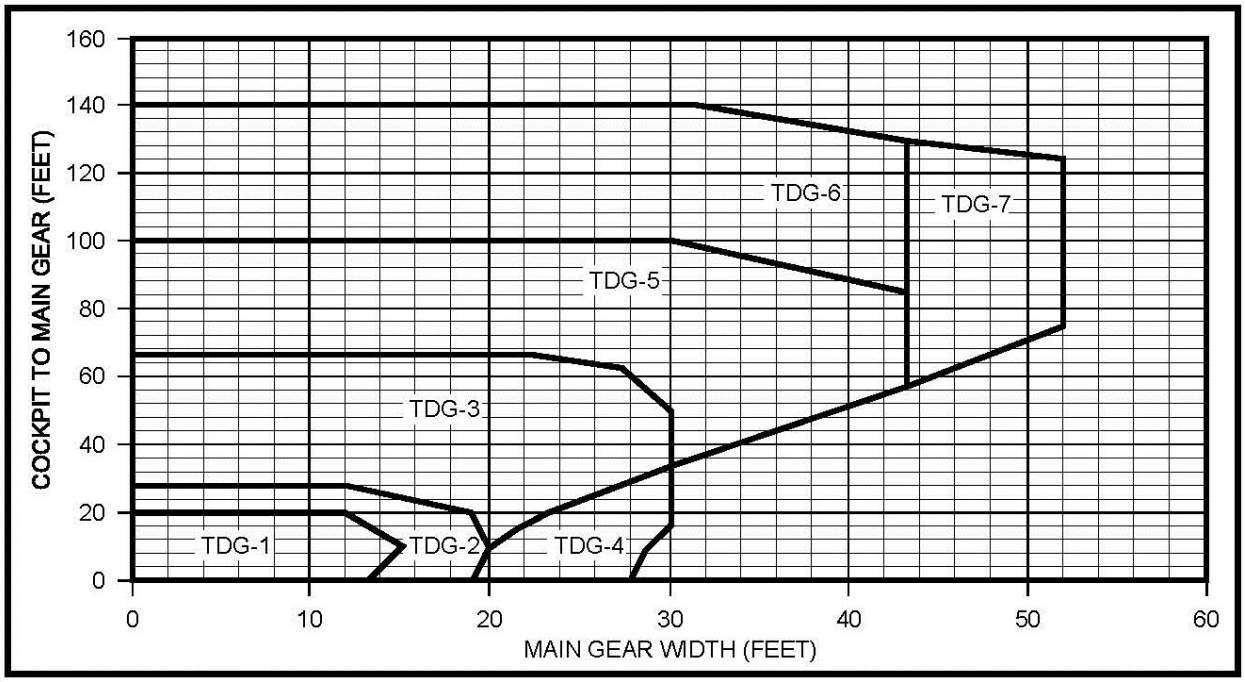
Approach Visibility Minimums	
RVR (ft)[1]	**Flight Visibility Category (statue mile)**
4000	Lower than 1 mile but not lower than ¾ mile (APV ¾ but< 1 mile
2400	Lower than ¾ mile but not lower than ½ mile (CAT-I PA)
1600	Lower than ½ mile but not lower than ¼ mile (CAT-II PA)
1200	Lower than ¼ mile (CAT-III PA)

1. RVR- Runway Visual Range. The approximate visibility (in feet) as measured by the RVR light transmission/reception equipment or equivalent weather observer report.

Taxiway Design Group (TDG)

Separation between runways, taxiways, taxilanes, and objects is related to the aircraft characteristics encompassed by the ADG: wingspan and tail height. The Taxiway Design Group (TDG) takes into account the dimensions of the aircraft landing gear to determine taxiway widths and pavement fillets to be provided at taxiway intersections. Fillet pavement is required to accommodate the inner wheel of the airplane as it turns. There are seven (1-7) TDG classifications that represent a function of main gear width and wheel base, which is the distance from nose gear to main gear. TDG classifications are presented in **Figure 3-4**.

Figure 3-4. Taxiway Design Group Determination



Other Airfield Design Considerations

In addition to RDC and TDG, the following design considerations affect airport geometry and development patterns.

- **Approach and departure protection**—Runway approach minimums and flight procedures are determined by imaginary surfaces that originate from the runway. These surfaces typically extend along the extended runway centerline, or branch out laterally from the runway. Runways are typically aligned to avoid terrain and tall structures that can impose operational restrictions and reduce airport utility. New construction can impose restrictions on aircraft operations if the construction penetrates the imaginary surfaces. Airports typically work with nearby communities to adopt land use planning techniques to minimize incompatible development. Imaginary surfaces are often used to determine whether the height and location of a structure will adversely impact aircraft operations.
- **Prevailing winds and weather patterns**—Runways are generally aligned so that aircraft can arrive and depart into the prevailing winds. Multiple runway alignments may be necessary in locations that

experience high crosswinds on the primary runway more than five percent of the year. Instrument approach procedures and related navigational aids (NAVAIDs) are developed based on the prevailing wind and weather patterns to maximize utility. Commonly, the operating pattern needed during inclement weather is opposite of that used during fair weather as a result of wind circulation patterns.

- **Controller line of sight**—Air traffic controllers require an uninterrupted line of sight between the air traffic control tower (ATCT) and approach and departure corridors, runways, taxiways, and aprons. Protection of controller line of sight often restricts building placement.
- **Critical areas**—Airports have an abundance of electronic equipment used for navigation, communication, security, and surveillance. Most of these items require clear and graded areas, setbacks from certain objects and construction materials, and a clear corridor between transmitters and receivers. Development and the types of activities that may occur is restricted in these areas.
- **Visual aids to navigation**—Certain visual aids, including the airport beacon, runway approach lighting, and runway glide path indicator lights require unobstructed views to aircraft in flight that need to be considered in the planning and design of airport facilities.
- **Airfield line of sight**—Operations on intersecting runways cannot be operated independently of one another. The runway visibility zone (RVZ) must be clear of obstructions so that an aircraft approaching the intersection of the runways can see if there is other traffic. Similarly, runway grading standards are predicated on providing line of sight between aircraft operating at opposite ends of the same runway.
- **Independent versus dependent operating streams**—Runways that intersect or that have intersecting approach and departure corridors are dependent on each other. During high levels of activity, these dependencies cause delay. As delays increase, it may be necessary to provide an independent operating stream which can be accomplished by providing a parallel runway. Airplane wake turbulence is a consideration for determining the amount of space needed between parallel runways.

3.3 DESIGN AIRCRAFT SELECTION

The first step in airside facility planning is the selection of the design aircraft that will determine the scale and setbacks of airfield facilities. The process of determining a design aircraft is described in Section 3.3.1. The design aircraft at GEG is determined through an analysis of the existing fleet utilizing GEG, and considers the aviation forecasts in Chapter 2 and national fleet mix trends.

3.3.1 Runway 3/21 and Runway 7/25 Operational Analysis

Table 3-2 categorizes common scheduled and charter commercial aircraft operations at GEG from 2006 to 2010 by AAC, ADG, and TDG.

Table 3-2. Common Scheduled and Charter Commercial Operations (2006 – 2010)

Aircraft	AAC	ADG	TDG	Operations by Year				
				2006	2007	2008	2009	2010
Airbus A318	C	III	3			442	542	170
Airbus A319	C	III	3			1,108	1,692	1,826
Airbus A320	C	III	3	1,770	1,748	2,326	2,202	1,552
Boeing (Douglas) DC-9	C	III	3	532	530	532	50	40
Boeing 737-300	C	III	3	9,738	10,010	8,266	3,550	3,226
Boeing 737-400	C	III	3	2,146	1,360	894	770	472
Boeing 737-500	C	III	3	914	672	926	164	70
Embraer E170	C	III	3	0	522	904	226	340
Embraer E190	C	III	3	0	0	0	144	486
Bombardier CRJ-200	D	II	3	2,984	2,486	1,566	2,898	3,440
Bombardier CRJ-700	D	II	3	3,338	4,088	6,280	2,972	2,042
Bombardier CRJ-900	D	II	3	334	66	90	664	1,964
Embraer ERJ-145	D	II	3	2	4,010	4,442	6	6
Boeing 737-700	D	III	3	3,238	4,580	5,270	8,100	9,192
Boeing 737-800	D	III	3	374	1,290	1,780	1,870	1,958
Boeing 737-900	D	III	3	1,150	896	290	166	234
Bombardier Q400	C	III	5	9,104	10,780	9,074	10,556	10,886
Boeing (Douglas) MD-83	C	III	5	80	600	156	14	18
Boeing (Douglas) MD-87	C	III	5	0	0	12	12	28
Boeing (Douglas) MD-88	C	III	5	12	2	0	6	56
Boeing (Douglas) MD-90	C	III	5	378	566	1,038	370	898
Boeing 727-200	C	III	5	940	538	266	10	46
Airbus A300	C	IV	5	904	1,206	1,406	1,390	1,762
Airbus A310	C	IV	5	828	448	316	328	220
Boeing 757-200	C	IV	5	90	194	320	278	218
Boeing 767-300	D	IV	5	792	748	740	718	706
			Total	**39,648**	**47,340**	**48,444**	**39,698**	**41,856**

Source: FAA Enhanced Traffic Management System Counts

The most demanding commercial aircraft from 2006 to 2010 was the Boeing 767-300, which currently operates at GEG as a cargo transport and as a charter passenger transport. The Boeing 767 is an AAC-D, ADG-IV, TDG-5 aircraft.

According to estimates by ATCT personnel, most commercial aircraft operations are conducted on Runway 3/21; however, approximately 10 percent of Bombardier Q400 operations occur on Runway 7/25, making it the most demanding aircraft using Runway 7/25 on a regular basis. The landing gear configuration of the Q400 has unique taxiway width and fillet design requirements for an aircraft of its size. Boeing 737 aircraft occasionally utilize Runway 7/25.

Table 3-3 categorizes GEG's larger general aviation (GA) aircraft operations by AAC, ADG, and TDG. These aircraft include a combination of private aircraft and for-hire air taxi operators.

Table 3-3. GA Operations (2006 – 2010)

Aircraft	AAC	ADG	TDG	Operations by Year				
				2006	2007	2008	2009	2010
Citation I	B	I	1	64	56	42	50	40
Beechjet 400	C	I	1	164	156	126	78	90
Learjet 25	C	I	1	18	24	48	28	24
Learjet 31	C	I	1	116	118	108	164	372
Learjet 35/36	D	I	1	386	350	276	204	248
Citation V/Ultra/Encore	B	II	1	216	222	212	214	262
Challenger 300	B	II	1	30	30	58	40	44
Citation III/VI/VII	C	II	1	244	284	206	180	192
Falcon 10	B	I	2	22	36	20	16	10
Raytheon Premier 1	B	I	2	28	32	14	20	18
IAI 1124 Westwind	C	I	2	50	60	44	36	14
IAI 1125 Astra	C	I	2	74	48	46	18	20
Learjet 40/45	C	I	2	170	172	220	192	242
Learjet 55/60	C	I	2	128	82	76	84	78
Citation II/Bravo	B	II	2	224	258	232	210	188
Citation Excel/XLS	B	II	2	154	194	130	92	152
CitationJet 1/2/3	B	II	2	532	490	388	294	332
Falcon 20	B	II	2	12	20	14	14	18
Falcon 2000	B	II	2	52	72	42	66	42
Gulfstream G150	C	II	2	0	16	30	18	14
Challenger 600/601/604	C	II	2	92	98	68	66	86
Citation X	C	II	2	92	114	96	110	110
Gulfstream G200	D	II	2	74	84	38	34	32
Falcon 50	B	II	3	32	34	30	20	30
Falcon 900	B	II	3	20	24	32	26	44
Citation Sovereign	B	II	3	32	92	118	88	122
Hawker 800/800XP	C	II	3	214	238	194	98	170
Gulfstream G300	C	II	3	8	22	4	8	14
Gulfstream G400	D	II	3	56	56	46	44	84
Bombardier BD-700	C	III	3	8	14	10	16	22
Gulfstream G500	D	III	3	16	24	12	24	42
			Total	**3,328**	**3,520**	**2,980**	**2,552**	**3,156**

Source: FAA Enhanced Traffic Management System Counts

The commercial aircraft are the most demanding operators at GEG in terms of aircraft size (ADG and TDG); however, the higher approach speed business jets contributed an average of 426 annual AAC D operations from 2006 to 2010.

Table 3-4 combines the commercial and GA aircraft operations into totals by ACC-D, ADG-IV, and TDG-5. This provides support that GEG is currently functioning as AAC-D, ADG-IV, and TDG-5 airport.

Table 3-4. Operations by ACC-D, ADG-IV and TDG-5 (2006 – 2010)

Design Component	Operations				
	2006	2007	2008	2009	2010
AAC-D	12,744	18,678	20,830	17,700	19,948
ADG-IV	2,614	2,596	2,782	2,714	2,906
TDG-5	13,128	15,082	13,328	13,682	14,838
Total	**28,486**	**36,356**	**36,940**	**34,096**	**37,692**

3.3.2 Forecast Trends

The aviation demand forecasts in Chapter 2 project that operations by AAC-D, ADG-IV, TDG-5 airplanes will increase in terms of total operations and as a percentage of total operations. Aviation demand forecasts do not specifically project the introduction of scheduled commercial aircraft that are more demanding than those operating at GEG in 2013.

3.3.3 Extended Outlook

The airport master plan is the sponsor's vision for the airport. The vision of GEG includes a future west-side parallel runway. From a capacity perspective, aviation demand forecasts project 121,000 annual operations at GEG within the 20-year planning horizon, which is 56% of the Airport's ASV. For this reason, the long-term vision extends beyond the 20-year. The Airport's vision for future airfield layout is similar to present-day Portland International Airport (PDX). PDX has two fully independent primary runways, a crosswind runway that intersects one of the primary runways, a midfield terminal, and several airline maintenance support facilities. The 2012 FAA Terminal Area Forecast indicates that PDX had 216,000 annual aircraft operations. PDX has scheduled Boeing 747-400 air cargo operations, and a paint facility for Boeing 747 and 777 aircraft.

Airport management is pursuing expansion of the MRO facilities and airplane manufacturing businesses located at the Airport. GEG has a paint facility and interior finishing centers that are considering expansion. New facilities could be developed in the near-term, which may potentially trigger additional development of related airplane fabrication businesses at GEG. MRO related facilities under consideration could potentially accommodate ADG-V or -IV aircraft such as the Boeing 747 and Airbus A380. GEG has a competitive advantage over other airports in the region due to existing adequate runway length, a category III precision instrument approach, ample property with aviation, rail, and road connectivity, a specialized aviation employment base in the Spokane area, and existing contractual relationships with Boeing and its service partners. GEG has property available to accommodate demand that is unable to be met at other airports in the region. The Master Plan positions GEG to be unconstrained and flexible.

3.3.4 Design Aircraft Selections and Recommendations

Design aircraft characteristics that will guide airside facility planning are summarized in **Table 3-5**. The Boeing 767-300 is the design aircraft for Runway 3/21 and associated facilities. Runway 7/25 and associated facilities will utilize a composite of two design aircraft types: the Bombardier Q400 and the Boeing 737-400. This section concludes with planning recommendations intended to facilitate the transition from an ADG-IV design aircraft to a larger ADG category (V or VI).

Table 3-5. Design Aircraft Characteristics

Design Characteristics	Runway 3/21 Facilities	Runway 7/25 Facilities
Design Aircraft	**Boeing 767-300F[1]**	**Bombardier Q400[2] / (Boeing 737-400[3])**
Airplane Approach Category	D	C
Airplane Design Group	IV	III
Taxiway Design Group	5	5
Approach Speed (NM/HR)	145	(139)
Wingspan (FT)	156.1	(94.8)
Tail Height (FT)	52.9	(36.6)
Length (FT)	180.3	(119.6)
Cockpit to Main Gear Length (FT)	89.9	43.5
Wheel Base (FT)	74.7	45.8
Main Gear Width (outer edge- FT)	30.5	28.8
Gear Configuration	2D	D
Maximum Takeoff Weight (LBS)	412,000	(150,000)

Sources:

1. 767 Airplane Characteristics for Airport Planning (September 2005)

2. Q400 Airport Planning Manual (May 2001)

3. 737 Airplane Characteristics for Airport Planning (October 2005)

The design aircraft are the most demanding aircraft to frequently operate at GEG; however, the Airport can accommodate a larger aircraft. This capability supports airport management initiatives aimed at bringing additional large aircraft MRO and manufacturing businesses to the Airport. As the Airport sees more routine operations by ADG-V and larger aircraft, it is recommended that the Airport plan to upgrade markings and separation distances to meet FAA design standards associated with the larger ADG. For Runway 3/21, it is recommended that runway-taxiway, taxiway-taxiway, taxilane, parking limit lines, and building restriction lines be evaluated for potential upgrade to ADG-V setback criteria as facilities require reconstruction. It is recommended that future taxiway development and reconstruction be evaluated to facilitate transition from TDG-5 to TDG-6.

The Airport's near-term strategy to transition from TDG-5 to TDG-6 focuses on applying TDG-6 setbacks to future taxiway and structure projects. TDG-6 taxiways and associated costs not be eligible for FAA reimbursement until GEG meets the FAA substantial use threshold, 500 annual unscheduled operations or scheduled operations by TDG-6 aircraft. The Airport can prepare for transition from TDG-5 to TDG-6 by developing outside of the TDG-6 object free area, which will facilitate TDG-6 transition when justified.

3.4 WIND COVERAGE AND WEATHER CONSIDERATIONS

One of the primary factors influencing runway orientation and the number of runways is wind. Ideally, runways are aligned so that airplanes may take-off and land into a headwind and that minimize the challenges associated with crosswinds. Small, light aircraft are more affected by crosswinds than are larger, heavier ones. Variations in wind patterns are assessed to determine if more than one runway alignment is needed to negate these effects. When the primary runway provides less than 95% wind coverage, a crosswind runway is recommended. Wind coverage is amount of time the crosswind component remains below the thresholds established for four AAC-ADG combination categories described in 5300-13A.

Wind Coverage Requirements
Source: AC 150/5300-13A

An airport must demonstrate the ability to provide 95% wind coverage with minimum crosswind velocities by AAC-ADG:

- 10.5 knots for A-I and B-I.
- 13 knots for A-II and B-II.
- 16 knots for A-III, B-III, and C-I through D-III.
- 20 knots for A-IV through D-VI.

Wind data was acquired from the National Oceanic and Atmospheric Administration weather station in Spokane (# 72785) for a ten year period. This data was evaluated using 4 sets of weather conditions: all weather, visual meteorological conditions (VMC), instrument meteorological conditions (IMC), and poor visibility conditions (PVC). GEG is prone to fog and low visibility conditions in the winter. **Table 3-6** summarizes the ceiling and visibility conditions at GEG.

The Airport is under IMC (cloud ceiling < 1,000 feet and/or ceiling < 3 miles) during 10.4% of the year. Nearly a third of the time during IMC, airport weather is classified as PVC (ceiling < 200 feet and/or visibility < ½-mile). The high frequency of PVC (3.1% of the year), combined with the evenly distributed north and south prevailing winds, highlights a need to provide precision approach procedures in both directions that support continued operations in low visibility.

Table 3-6. Weather Occurrences

Condition	Total Observations	Percent Occurrence	Description	
			Ceiling	Visibility
VMC	74,162	89.6 %	> 1,000’	>3 miles
IMC	6,066	7.3 %	1,000’> and >200’	3 miles> and > ½ mile
PVC	2,578	3.1 %	< 200’	<1/2 mile
ALL	82,806	100%	ALL	ALL

Source: NOAA, FAA Airport Design AC 150/5300-13, Mead & Hunt; Data Site: Spokane Weather Station (# 72785)
Period of Observations: Jan 2000 – Dec 2009; VMC: Cloud ceiling ≥ 1,000 FT and visibility ≥ ceiling ≥ 3 miles
IMC: Cloud ceiling < 1,000 FT and/or visibility < 3 miles, but ceiling > 200 feet and visibility < ½-mile
PVC: Cloud ceiling < 200 FT and/or visibility < ½-mile

As shown in **Table 3-7**, Runway 3/21 alone provides over 96% wind coverage and for each of the three cloud ceiling and visibility combinations. When combined with additional wind coverage of Runway 7/25, GEG has nearly 100% wind coverage. Wind analysis demonstrates that the alignment of Runway 3/21 provides the required wind coverage for even the lightest airplanes most impacted by crosswinds. The lack of east/west wind allows considerable planning flexibility at GEG, and Runway 7/25 provides operational flexibility. All-weather and instrument weather wind roses are depicted in **Figure 3-5**.

Table 3-7. Wind Coverage

All Weather					Visual (VMC)				
Runway	**10.5 kts**	**13 kts**	**16 kts**	**20 kts**	**Runway**	**10.5 kts**	**13 kts**	**16 kts**	**20 kts**
3/21	97.08 %	98.67 %	99.72 %	99.95 %	**3/21**	97.03 %	98.65 %	99.72 %	99.95 %
7/25	86.84 %	92.70 %	97.75 %	99.49 %	**7/25**	86.24 %	92.35 %	97.63 %	99.46 %
Combined	97.99 %	99.27 %	99.86 %	99.99 %	**Combined**	98.00 %	99.27 %	99.86 %	99.99 %
Instrument (IMC)					**Poor (PMC)**				
Runway	**10.5 kts**	**13 kts**	**16 kts**	**20 kts**	**Runway**	**10.5 kts**	**13 kts**	**16 kts**	**20 kts**
3/21	96.49 %	98.27 %	99.64 %	99.94 %	**3/21**	99.55 %	99.80 %	100 %	100 %
7/25	88.58 %	93.79 %	98.25 %	99.61 %	**7/25**	98.75 %	99.43 %	99.94 %	100 %
Combined	97.11 %	98.92 %	99.81 %	100 %	**Combined**	99.62 %	99.87 %	100 %	100 %

Sources: NOAA, FAA Airport Design AC 150/5300-13, Version 4.2, Mead & Hunt
Data Site: Spokane Weather Station (# 72785)
Period of Observations: Jan 2000 – Dec 2009
Number of Observations: 83,187

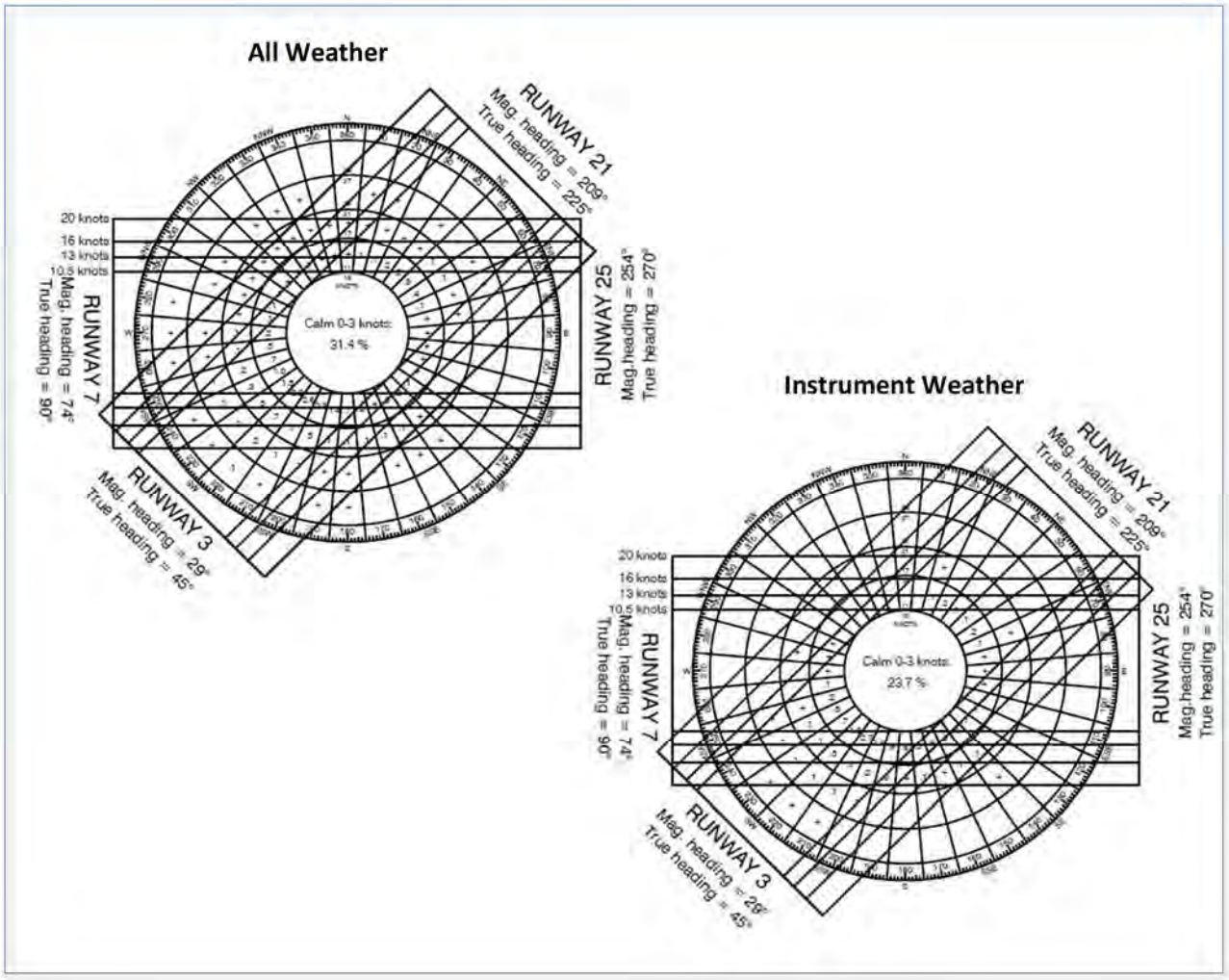


Figure 3-5

Wind Roses
Spokane International Airport

3.5 RUNWAY 3/21 FACILITIES

This section identifies the various FAA design standards associated with the primary runway system, and analyzes the degree to which GEG complies with these standards. This analysis includes the following elements.

- Identifying the runway design code.
- Assessing the degree to which design standards are met now and in the future.
- Presenting primary runway length and pavement strength requirements.
- Assessing ancillary facilities such as lighting and signage.
- Defining runway end protection surfaces and how they relate to off-airport development.

3.5.1 Runway 3/21 Runway Design Code (RDC)

The first two components of the RDC are AAC-D and ADG-IV, based on the Boeing 767 design aircraft. Over three percent of GEG's operations occur during poor visibility, often during wet and slippery runway surface conditions. To support operations in these conditions, Runway 3/21 has two instrument landing system (ILS) precision approach procedures, approach lighting, high intensity runway edge lighting, centerline lighting, and touchdown zone lights. ILS procedures on Runway Ends 3 and 21 allow continued landings to 600 feet runway visual range (RVR). The RDC for Runway 3/21 is D-IV-1200. The 1200 indicates a precision approach with less than 1200 RVR. Approach and lateral setbacks are more restrictive for runways capable of accommodating operations during low visibility.

The RDC for Runway 3/21 is D-IV-1200.

3.5.2 Runway 3/21 Design Standards

This section identifies the design standards associated with the existing and ultimate RDC for Runway 3/21. Future improvements should be made so that they are in compliance with the existing design standard. The Airport should use the ultimate setback standards when siting facilities that are expected to remain beyond the 20-year planning period to facilitate the transition to the ultimate design stands should they become justified. The ultimate RDC relates to the long-term vision for the Airport, which may not occur within the 20-year planning period. The runway design standards matrix is provided in **Table 3-8**.

Runway 3/21 currently meets or exceeds existing FAA design standards associated with RDC D-IV-1200. Existing facilities can accommodate the larger aircraft with minimal adjustment.

Table 3-8. Runway 3/21 Design Standards Matrix[1]

Runway Design Code (RDC) Taxiway Design Group (TDG)	Existing D-IV-1200 5			Ultimate D-V-1200 6
Item	**FAA Standard**	**Actual**	**Standard Met**	**Ultimate**
Runway Design				
Runway Width	150 FT	150 FT	Yes	No change
Shoulder Width	25 FT	25 FT	Yes	35 FT
Blast Pad Width	200 FT	200 FT	Yes	220 FT
Blast Pad Length	200 FT	400 FT	Yes	400 FT
Crosswind Component	20 knots	20 knots	Yes	No change
Runway Protection				
Runway Safety Area (RSA)				
Length beyond departure end	1000 FT	1000 FT	Yes	No change
Length prior to threshold	600 FT	1000 FT	Yes	No change
Width	500 FT	500 FT	Yes	No change
Runway Object Free Area (ROFA)				
Length beyond departure end	1000 FT	1000 FT	Yes	No change
Length prior to threshold	600 FT	1000 FT	Yes	No change
Width	800 FT	500 FT	Yes	No change
Runway Obstacle Free Zone (ROFZ)				
Width	400 FT	400 FT	Yes	No change
Vertical (H)	27.6 FT	27.6 FT	Yes	20.1 FT
5:1 segment length from centerline (Y)	551.5 FT	551.5 FT	Yes	613.9 FT
6:1 final segment height above airport	150 FT	150 FT	Yes	No change
Precision Obstacle Free Zone (POFZ)				
Length	200 FT	200 FT	Yes	No change
Width	800 FT	800 FT	Yes	No change
Approach Runway Protection Zone (RPZ)				
Length	2500 FT	2500 FT	See notes 2 and 3.	No change
Inner Width	1000 FT	1000 FT		No change
Outer Width	1750 FT	1750 FT		No change
Acres	78.914	78.914		No change
Departure Runway Protection Zone (RPZ)				
Length	1700 FT	1700 FT	Yes	No change
Inner Width	500 FT	500 FT	Yes	No change
Outer Width	1010 FT	1010 FT	Yes	No change
Acres	29.465	29.465	Yes	No change
Runway Separation				
Runway centerline to:				
Holding position[4]	274 FT	313 FT	Yes	304 FT
Parallel taxiway/taxilane centerline	400 FT	TW A: 700 FT TW G: 600 FT	Yes	500 FT
Taxiway centerline with reverse turn	600 FT	TW A: 700 FT TW G: 600 FT	Yes	No change
Aircraft parking area	500 FT	760 FT	Yes	No change

Notes

1. Source: FAA Advisory Circular 150/5300-13A, Airport Design (September 2012)
2. Airport Drive traverses a small portion of the outer northwest corner of the Runway 21 approach RPZ.
3. Electric Avenue traverses the Runway 3 approach RPZ.
4. The holding position standard includes an elevation adjustment of 1 foot for every 100 feet above sea level.

The function of the runway protection zone (RPZ) is to protect persons and property on the ground. It is recommended that the Airport own and control the property, and maintain it clear to the maximum extent practical. There are roads in the RPZs at both approach ends of Runways 3 and 21. Using FAA guidelines, existing roads in the RPZ are acceptable as long as no additional roads are added, and as long as the runway end does not move closer to the road. GEG owns the property within its RPZs, and controls the area within the road right-of-ways. Historically, other land uses to be avoided within the RPZ included areas of public assembly; uses that generate glare, smoke, and dust; flammable material storage; and automobile parking within the central portion of the RPZ. Interim FAA policy is to either avoid future roads within an RPZ, or to incorporate design mitigations that reduce risk to people on the ground.

Guidance for RPZ-compatible activities is currently contained in FAA Memorandum, *Interim Guidance on Land Uses Within a Runway Protection Zone* (9/27/2012). New RPZ policy regarding existing/proposed land uses is expected in 2014. The current discussion focuses on whether or not public roadways are considered to be a permitted use. Improvements to an approach or runway that would extend an RPZ across a road, and road improvements within an existing RPZ that would increase roadway capacity or more the road closer to the runway end will require case-by-case evaluation and approval that is subject to the applicable guidance in effect at the time of the recommended improvement.

3.5.3 Runway 3/21 Length

AC 150/5325-4B, *Runway Length Requirements for Airport Design*, states that a runway should be constructed to a length "that is suitable for the forecasted critical design aircraft," and the required runway length is "the longest resulting length after any adjustments for all the critical design aircraft under evaluation."

A generalized analysis was performed using airport planning manuals provided by aircraft manufacturers. A range of take-off runway lengths are presented in **Table 3-9**. Takeoff lengths will vary based on different engine options, aircraft weight, and ambient temperature. It is assumed, unless otherwise noted, that aircraft are operating at maximum take-off weight (MTOW) on hot weather days.

Runway length requirements range from 7,000 feet to 14,000 feet. Most aircraft operations can be accommodated using Runway 3/21, which is 11,002 feet long with minimal performance concessions. The Boeing 767-300 can require up to 12,000 feet during summer weather. Operations by the Boeing 767-300 and similarly demanding aircraft are forecast to increase, therefore; it is recommended that an ultimate runway length of 12,000 feet be preserved on the ALP. This recommendation is consistent with the 2003 Plan and ALP, which both illustrate a 1,000-foot extension to Runway End 3.

Table 3-9. Runway Length Requirements for Common Aircraft at GEG

Aircraft Type	Engine	MTOW	Temp. (˚F)	Required length for takeoff, at 2,400 feet	Notes
Boeing 737-800 and BBJ2	CFM56-7B24/-7B24/-7B27	174,200	95	14,000* 12,000^	*MTOW ^ @170K TOW
Boeing 767-300	JT9D-7R4D	350,000	77	12,600	
Boeing 767-300	CF6-80A	350,000	83	12,000	
Boeing 737-900	CFM 56-7B24/-7B26	174,200	95	12,000*	* @158K TOW
Boeing 767-ER	CF6-80C2B4* CF6-0C2B6	412,000	81 77	11,900	*MTOW 390k
Airbus 300F4-600	CF6-80C2	375,880	109	11,200	
Boeing 767-ER	CF6-80C2B7F; PW40062	412,000	81	11,000	
Boeing 767-300	CF6-80C2B2	350,000	81	10,000	
Airbus 300F4-600	CF6-80C2F	375,880	109	10,000	
Airbus 320-200	CFM56	162,040	109	7,000	
ERJ 190 - AR	ESA1	111,000	95	6,890’	
Airbus 310-200	CF6-80 A3	291,000	109	6,800	
Airbus 320-100	CFM56	145,505	109	5,500	

Sources: Aircraft Specifications and Airport Planning Manuals. Runway length requirements are estimations based on charts for planning purposes and should not be considered for actual operations.

3.5.4 Runway 3/21 Pavement Strength

Airfield pavements are designed to have a 20-year lifespan. Pavement load baring capacity is based on construction materials, thicknesses, and on aircraft weight and landing gear configuration. Published load bearing capacities relate to useful pavement life, and are not a threshold for pavement failure. Heavier aircraft may use the pavement on an infrequent basis, but regular use by aircraft that exceed a pavements load bearing capacity will accelerate pavement degradation.

Existing aircraft operations are conducted by a range of light (< 12,500 pounds) and heavy (> 300,000 pounds) airplanes, and those in between. Published pavement strengths for Runway 3/21 and associated primary taxiways and taxilanes are as follows.

- 200,000 pounds, single-gear
- 200,000 pounds, dual-wheel gear
- 400,000 pounds, dual-tandem gear

The heaviest scheduled aircraft by MTOW are presented in **Table 3-10**. The existing pavement strength rating is adequate for aircraft that use Runway 3/21, and it is recommended that the Airport maintain this pavement strength for the next 20 years. Pavement strength should be reevaluated as the Airport sees more operations by aircraft with a MTOW over 400,000 pounds, upon upgrading to RDG D-V-1200, and during pavement rehabilitation projects.

Table 3-10. Heaviest Airplanes Operating at GEG		
Airplane	**Wheel Configuration**	**MTOW (lbs.)**
Boeing 767-ER	Dual- Tandem	412,000
Airbus 300F4-600	Dual- Tandem	375,880
Boeing 767-300	Dual- Tandem	350,000
Airbus 310-200	Dual- Tandem	312,000
Boeing 757-200	Dual- Tandem	255,000
Boeing 737-900	Dual- Tandem	187,700

Sources: Airport planning manuals and Aircraft specifications

3.5.5 Runway 3/21 Lighting, Marking, Signage, and Instrumentation

Lighting, signage, and markings are essential safety components of the airfield. Lighting, signage, and marking standards are intended to provide a consistent system of visual indications that promote safety and efficiency, and that are recognized worldwide.

Approach Lighting

Runway Ends 3 and 21 are equipped with High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2). These are standard systems for the low visibility operations occurring at GEG. No changes are recommended.

Visual Approach Aids

Runway Ends 3 and 21 are equipped with a Precision Approach Path Indicator (PAPI) lights. These assist in maintaining the optimal descent path to touchdown. No changes are recommended.

Runway and Taxiway Edge Lighting

AC 150/5340-30D, *Design and Installation Details for Airport Visual Aids*, and Joint Order 6850.2B, *Visual Guidance Lighting Systems*, provide guidance and recommendations on the installation of airport visual aids. This includes lighting standards for runways equipped with instrument approach procedures.

Runway 3/21 is equipped with high intensity runway edge lights, centerline lights and touchdown zone lights appropriate for the low visibility operations. No changes are recommended.

Airfield Signage

GEG is certificated under Code of Federal Regulations Title 14 (14 CFR), Part 139, which requires a Signage Plan in the Airport Certification Manual. The Signage Plan must show the sign system needed to identify hold positions and taxiing routes on the movement area for air carrier aircraft in accordance with AC 150/5340-18D, *Standards for Airport Sign Systems.* The airfield signage plan should be updated as needed to comply with current safety standards and operating conditions.

Airfield Markings

Standards for runway and taxiway markings are set in accordance with AC 150/5340-1K, *Standards for Airport Markings.* Types of markings on the runways and taxiways are described in Chapter 1. Other than routine maintenance and painting, no changes are recommended.

Each taxiway is marked with edge and centerline stripes. Enhanced taxiway and holding position markings are to be provided at the entrance and exit points of the runways. Future taxiways should be painted with edge and centerline markings and enhanced surface markings at all runway holding positions.

Runway Hold Positions

Runway holding position lines (holdlines) identify the location on a taxiway where operators are to stop and obtain clearance before proceeding onto the runway. Based on the airport elevation and RDC, the appropriate setback distance is 274 feet. GEG currently uses a 313-foot setback to the holdline, exceeding the standard. The Airport has the option to relocate holdlines closer to the runway centerline if it provides an operational benefit. For angled taxiways, the distance from centerline to holdline is measured from the edge of the holdline closest to the runway. Generally, the holdlines are to be installed perpendicular to the taxiway centerline. Hold position signs should coincide with marking locations.

Land and Hold Short Positions

On occasion, an airplane will be cleared to land and hold short on one runway while another airplane is operating on an intersecting runway. The hold short positions are marked on the runway with standard runway hold markings, signage, and in-pavement pulsing white lights. Hold short positions are located at a distance identical to the distance from runway centerline to hold position. The existing Runway 3/21 land and hold short markings, signage, and lighting are appropriately positioned. No changes are recommended.

ILS Critical Areas

ILS critical areas are identified with ILS hold markings and signage, and are located on the entrance taxiways at Runways Ends 3 and 21 for localizer protection, and on Taxiway G for Runway 21 glideslope protection. ILS critical areas identify the location where aircraft and vehicles are prohibited while the ILS is operational and an aircraft is on approach. This prevents interference with radio-signals vital to instrument operations. The critical areas will need to be adjusted when Runway 3/21 is extended, and if the NAVAIDs are relocated.

3.5.6 Runway 3/21 End Protections

The approach and departure corridor along the extended centerline of a runway is vitally important to the safe and efficient operation of an airport. The corridor is most critical (closest to the ground) at the runway departure end and landing threshold. The corridor generally becomes less critical as distance increases from the runway end, depending on topography. The corridor is used for transitioning departures and landings under visual flight conditions; providing clear paths during instrument flight conditions; providing one-engine inoperative safety routes; maintaining a line of sight between visual aids and aircraft; protecting persons and property on the ground near the airport; and avoiding land uses that are incompatible with aircraft operations on the basis of height, use, and noise sensitivity.

FAA grant assurances require airport operators to protect the airspace near the airport to support a safe and efficient air transportation system. Airports are to take appropriate actions that restrict and otherwise maintain land use development patterns that are compatible with airport operations. Several criteria apply to runway ends, including: federal regulations pertaining to airport obstruction identification (14 CFR, Part 77), U.S. Terminal Instrument Procedures (TERPS), aircraft certification standards (one-engine inoperative climb standards and emergency route planning), and airport planning and design standards (5300-13A), including runway threshold siting surfaces and RPZs. No specific actions are needed other than to maintain continued vigilance with regard to future encroachment into airport-critical operational zones. An example illustration of these various obstacle clearance surfaces is graphically depicted in **Figure 3-6** and described below.

FAA Grant Assurances— Airport operators that accept FAA-administered financial assistance, such as Airport Improvement Program (AIP) grants, must agree to certain obligations to maintain and operate their facilities safely and efficiently and in accordance with the specified conditions that are generally intended to protect federal infrastructure investments.

- **14 CFR, Part 77, *Civil Airport Imaginary Surfaces***—Establishes standards for determining obstructions to navigable airspace, notification requirements (for proposed construction), and forms the basis for aeronautical evaluation studies performed by the FAA. Paragraph 77.25 identifies "imaginary surfaces" that correspond to the runway type and elevation. Obstacles that penetrate these imaginary surfaces are mapped and tracked in various databases and aviation publications. The FAA evaluates proposed construction to determine potential impacts to aviation and possible mitigations techniques, such as lighting and marking. Key components of Part 77 include approach surfaces and transitional surfaces. The approach surface for Runway 3/21 extends at a slope of 50 feet horizontal (H):1 for vertical (V) for a distance of 10,000 feet from each runway end, and then 40H:1V for an additional 40,000 feet. The transitional surfaces has a slope of 7H:1V, and begin at 500 foot offsets from either side of the runway centerline.
- **Visual aid protections**—Runway Ends 3 and 21 are equipped with a high intensity approach lighting system. Each system is 2,400 feet in length with individual light stands spaced approximately 100 feet apart on the extended centerline. An imaginary plane extends through the lights above which no obstacle may penetrate. The PAPIs also have an associated clear area, although other clearance requirements are more restrictive.

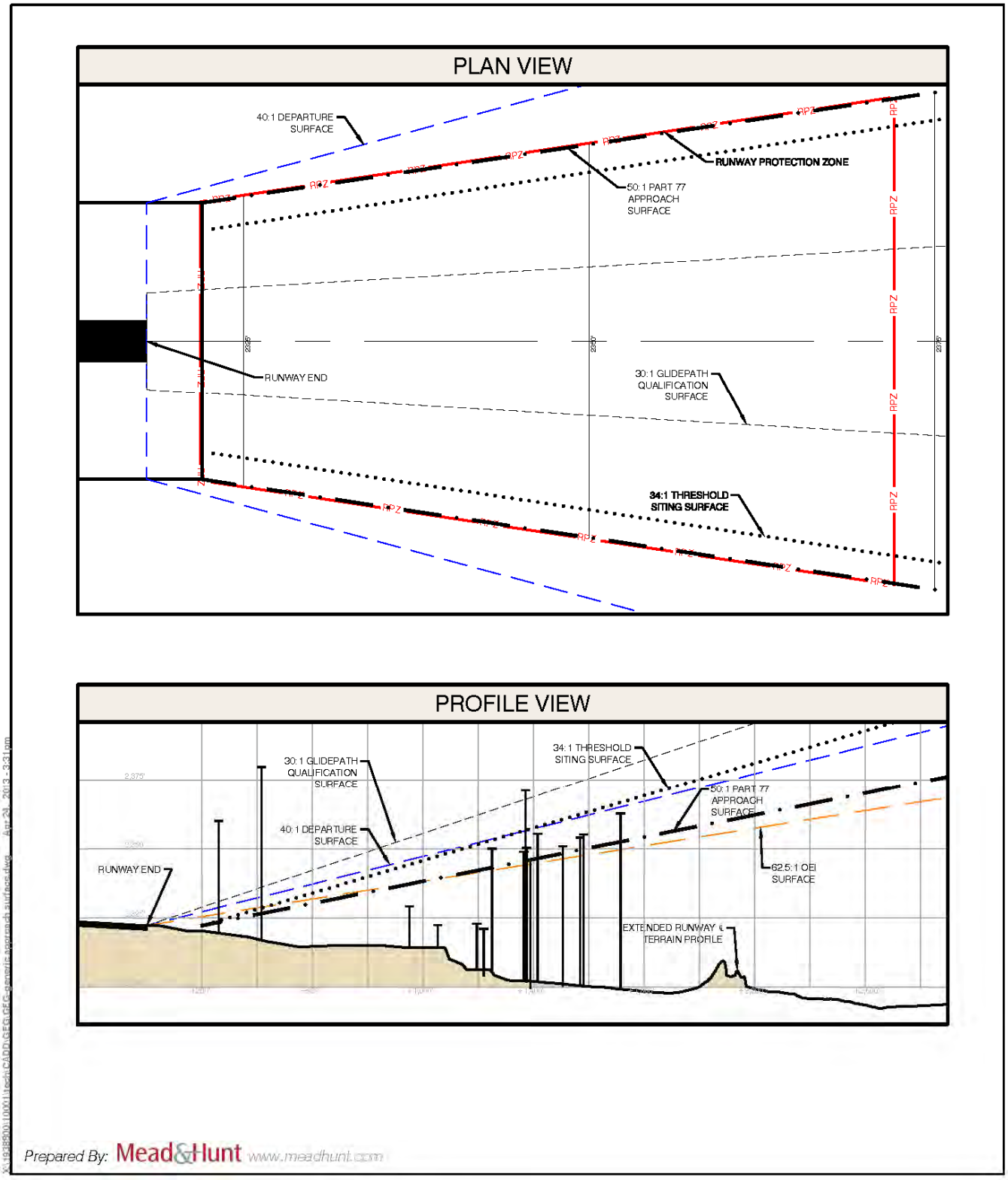


Figure 3-6

Example Runway End Protections

Spokane International Airport

- **US Terminal Instrument Procedures (TERPS**)—The criteria for developing instrument procedures are contained in a series of FAA orders (8260-series), with primary Order 8260.3B, *U.S. Standard for Terminal Instrument Procedures (*TERPS). The procedures are used to define corridors of airspace based on the type of operation (i.e., approach, departure, en-route, transition, etc.) and primary navigation type (i.e., GPS, VOR, ILS, RADAR, etc.). The TERPS surfaces tend to be less restrictive than Part 77 on and near an airport. Two notable exceptions include the departure surface and missed approach surfaces. The departure surface extends outward and upward beyond the departure end of the runway at 40V:1H. The missed approach area, particularly for low visibility approaches such as those that exist at GEG, can impose additional height restrictions and most often impact tall on-airport structures such as air traffic control towers.
- **Threshold Siting Surfaces (TSS)**—5300-13A includes several approach and departure surfaces for runway threshold siting. Objects penetrating the TSS require mitigation, and may require the displacement of the landing threshold. Landing threshold displacement reduces the landing distance available to arriving aircraft. Existing TSS at GEG are clear, but as with other runway end siting criteria, vigilance must be maintained to prevent future encroachment.
- **One Engine Inoperative (OEI) Surfaces**—Air carriers develop and maintain contingency procedures based on aircraft certification requirements to clear obstacles in the event that one engine becomes inoperative. OEI surfaces take into account the degraded climb performance associated with reduced power. The previous version of the 5300-13A attempted to incorporate OEI protections into airport planning since the standard FAA review process did not capture these impacts. The efforts were unsuccessful because of the shallow (62.5V:1H) slopes and relatively wide area of the surface typically contained an unmanageable number of obstructions. Impacts to OEI surfaces can reduce the utility of an airport to an airline, and can result in the discontinuation of service, or a change in aircraft type. While there is no uniform standard in place for OEI surfaces, airports should work with operators to identify critical corridors and review development proposals that extend obstacles above the current clear plane to each runway end. The ALP approach profile plans retain the 62.5:1 OEI surfaces to assist in the review of off-airport development proposals.

3.6 RUNWAY 7/25 FACILITIES

This section describes the planning process used for assessing Runway 7/25. Runway 7/25 provides the following benefits to the Airport.

- **Operational flexibility**—Aircraft operators are increasingly electing to use Runway 7/25 in order to achieve operational benefits. Alaska Airlines' Q400s and Southwest Airlines' Boeing 737s use Runway 7/25 to reduce taxi and departure queues, and to improve the alignment with their on-course heading. The prevalence of light and variable winds at GEG is support these requests.
- **Backup primary runway**—Runway 3/21 experiences periods of closure due to construction, maintenance, snow and ice removal operations and, emergency closure. The availability of the secondary runway ensures that air service for the region can continue uninterrupted. Scheduled passenger and cargo operators generally require a secondary runway for backup purposes.
- **Improved traffic efficiency**—Runway 7/25 enhances the air and ground operational flow. Slower traffic can be sequenced onto the secondary runway and remain clear of the primary traffic flow used by faster aircraft. GA facilities are located adjacent to Runway 7/25, which reduces taxi time and distance for these operators, which typically use smaller aircraft than commercial passenger and cargo operators. Despite these efficiencies, there are operational dependencies resulting from the runway intersection and the flight corridor that overlaps FAFB. A future parallel runway is expected to improve traffic efficiencies at GEG.
- **Enhanced capacity**—Despite the operating dependencies associated with the intersecting runway configuration and the convergent GEG-FAFB operating streams, GEG is able to increase the flow rate by operating both runways simultaneously, and by varying the flow direction during light winds. As total operations increase toward ASV, ATCT personnel will likely implement more efficient flight control procedures to avoid delays.

3.6.1 Runway 7/25 Runway Design Code (RDC)

Section 3.3.4 identified a composite design aircraft consisting of the most demanding features associated with the Bombardier Q400 and Boeing 737-400. The first two components comprising the RDC are AAC-C and ADG-III. The third component applies the approach visibility minimums. Each runway end has two published GPS-based approaches (RNP and LPV). The LPV approaches have the lowest visibility minimums: ¾-mile for Runway 7 and 1-mile for Runway 25. Using the lowest visibility approach available, the RDC for secondary Runway 7/25 is C-III-4000.

Runway 7/25 functions as a backup to Runway 3/21, and will need to handle airport traffic when 3/21 is closed for maintenance and upgrade. It is recommended that the approaches into Runway End 7 and Runway End 25 are maintained, and that the Airport work to maintain land use compatibility within the approach corridors.

3.6.2 Runway 7/25 Design Standards

Design standards associated with Runway 7/25 are summarized in **Table 3-11.** Existing paved shoulders and blast pads do not meet FAA design standards for RDC C-III-2400. Improvements to meet design standards should be included in the next pavement rehabilitation project. Non-standard hold positions exist along Runway 7/25. Non-standard runway hold positions should be corrected to provide a minimum setback of 250 feet from the centerline of Runway 7/25. The table identifies Geiger Boulevard traversing a small portion of the outer southeast corner of the Runway 25 approach RPZ.

Table 3-11. Runway 7/25 Design Standards Matrix[1]

Runway Design Code (RDC) / Taxiway Design Group (TDG)	Existing C-III-4000 / 5			Ultimate C-III-2400 / 5
Item	**FAA Standard**	**Actual**	**Standard Met**	**Ultimate**
Runway Design				
Runway Width[2]	150 FT	150 FT	Yes	No change
Shoulder Width	25 FT	10 FT	No	25 FT
Blast Pad Width 7/25	200/200 FT	None/160 FT	No	200/200 FT
Blast Pad Length 7/25	200/200 FT	None/100 FT	No	200/200 FT
Crosswind Component	16 knots	16 knots	Yes	No change
Runway Protection				
Runway Safety Area (RSA)				
Length beyond departure end	1000 FT	1000 FT	Yes	No change
Length prior to threshold	600 FT	1000 FT	Yes	No change
Width	500 FT	500 FT	Yes	No change
Runway Object Free Area (ROFA)				
Length beyond departure end	1000 FT	1000 FT	Yes	No change
Length prior to threshold	600 FT	1000 FT	Yes	No change
Width	800 FT	500 FT	Yes	No change
Runway Obstacle Free Zone (ROFZ)				
Width	400 FT	400 FT	Yes	No change
Vertical (H)	NA	NA	Yes	45.0 FT
5:1 segment length from centerline	NA	NA	Yes	NA
6:1 final segment height above airport	NA	NA	Yes	150 FT
Precision Obstacle Free Zone (POFZ)				
Length	NA	NA	Yes	200 FT
Width	NA	NA	Yes	800 FT
Approach Runway Protection Zone (RPZ)				
Length 7/25	1700/1700 FT	1700/1700 FT	Yes/See note 3.	1700/1700 FT
Inner Width 7/25	1000/500 FT	1000/500 FT		1000/500 FT
Outer Width 7/25	1510/1010 FT	1510/1010 FT		1510/1010 FT
Acres 7/25	48.978/29.465	48.978/29.465		48.978/29.465
Departure Runway Protection Zone (RPZ)				
Length	1700 FT	1700 FT	Yes/See note 3.	No change
Inner Width	500 FT	500 FT		No change
Outer Width	1010 FT	1010 FT		No change
Acres	29.465	29.465		No change
Runway Separation				
Runway centerline to:				
Holding position	250 FT	205 to 295 FT	No	250 to 295 FT
Parallel taxiway/taxilane centerline	400 FT	C: 400-487 FT K: 583 FT	Yes	No change
Taxiway centerline with reverse turn	600 FT	TW A: 760 FT TW G: 600 FT	NA	No change
Aircraft parking area	500 FT	560 FT	Yes	No change
Notes				

1. Source: FAA Advisory Circular 150/5300-13A, Airport Design (September 2012)
2. Runway width for C-III aircraft with MTOW > 150,000 pounds is 150' per AC 150/5300-13A, Table A7-9, Footnote 12
3. Geiger Boulevard traverses a small portion of the outer southeast corner of the Runway 25 approach RPZ (Runway 7 departure RPZ).

3.6.3 Runway 7/25 Length and Width

Runway 7/25 is 8,199 feet long and 150 feet wide. The FAA has noted that they will fund up to 100 feet in runway width unless the Airport can demonstrate that aircraft requiring more use the runway over 500 times a year. The full length of the runway is available for takeoffs and landings in both directions. The FAA Airport Design computer program evaluated the length of Runway 7/25. The results are presented in **Table 3-12**.

Based on the results of the table below and verified through discussions with operators and air traffic controllers, the existing length is adequate for most aircraft operating at GEG. If aircraft take on more weight or require greater length for departures during hot weather conditions, Runway 3/21 provides the necessary length.

Table 3-12. FAA Runway 7/25 Length Analysis

Airport and Runway Data	
Airport Elevation	2,385 Feet
Mean Daily Maximum Temperature of the Hottest Month	83.00 F.
Maximum Difference in Runway Centerline Elevation	4 Feet
Length of Haul for Airplanes of more than 60,000 pounds	1,500 miles
Wet and Slippery Runways	
Runway Lengths Recommended for Airport Design	
Large Airplanes	
Family Grouping	**Runway Length**
Airplanes ≤ 60,000 pounds ☐ 75% at 60% Useful Load ☐ 75% at 90% Useful Load ☐ 100% at 60% Useful Load ☐ **100% at 90% Useful Load**	 5,500 Feet 7,000 Feet 6,130 Feet **8,680 Feet**
Airplanes with > 60,000 pounds	7,950 Feet
Note: Useful load is the difference between the empty weight of the aircraft and the in MTOW. The empty weight of the aircraft does not include crew, usable fuel, passengers, baggage, or cargo. *Source: FAA Airport Design computer program 4.2D*	

3.6.4 Runway 7/25 Pavement Strength

Runway pavement strength should accommodate the heaviest aircraft routinely using the runway. Published pavement strengths for Runway 7/25 are as follows:

- 150,000 pounds, single-gear
- 180,000 pounds, dual-wheel gear
- 280,000 pounds, dual-tandem gear

Commercial aircraft may use Runway 7/25. The existing pavement strength is adequate for the heaviest regularly scheduled aircraft using Runway 7/25. Occasional use by heavier aircraft when Runway 3/21 is closed is acceptable on a non-regular basis.

3.6.5 Runway 7/25 Lighting, Marking, Signage, and Instrumentation

Some of the hold positions on Runway 7/25 are too close to the runway centerline. Relocating non-standard hold positions to at least 250 feet from the runway centerline will also require the relocation of the holding markings, signage, and lights. Assuming the continued operation of Runway 7/25 into the long-term, additional recommendations include installing approach lighting on Runway End 7 and upgrading runway markings to the precision approach standard.

3.6.6 Runway Ends 7 and 25 Protection

Runway end protections surfaces are described in Section 3.5.6. Geiger Boulevard crosses through the southeast corner of the Runway 25 approach RPZ. Hayford Road is scheduled to be realigned or tunneled when a 3rd runway is constructed in the future, and will no longer be located within the RPZ. In order to promote compatible land use and noise protection, it is recommended that the Airport acquire property and work with the surrounding communities to protect the extended approach area of Runway End 25.

3.7 TAXIWAY SYSTEM

Taxiways enable the movement of aircraft between the various functional areas on an airport. The taxiway system at GEG is assessed in terms of design standards and guidelines intended to enhance safety and pilot situational awareness; the efficiency of the system and its effects on airfield capacity; and taxiway design standards that apply to setbacks and pavement design.

3.7.1 Taxiway Design Standards

Similar to the runway design standards, the separation of taxiways from other airfield facilities is highly dependent on the ADG. Unlike runways, taxiway design is also influenced by the landing gear configuration, and considers the gear type, width, length, and relation to the cockpit. These characteristics are incorporated into the TDG. These characteristics influence pavement width and pavement fillet radii inside of a taxi turn. Using the existing aircraft mix, Section 3.3.1 identifies the taxiways at GEG as TDG-5. Most of the taxiways were designed to accommodate even more demanding aircraft types. To the extent practical, new taxiways should be designed with adequate object free area setbacks to incorporate an upgrade to TDG-6 in the long-term. Future taxiway improvements should be made to TDG-5 standards until TDG-6 standards are justified. Applicable taxiway design standards are contained in **Tables 3-13** and **3-14**. Taxiway fillet design requirements are contained in **Table 3-15**.

Table 3-13. Taxiway Design Standards based on Airplane Design Group (ADG)

ITEM	PLANNED: ADG IV	ULTIMATE: ADG V
Taxiway Safety Area (TSA)[1]	171 FT	214 FT
Taxiway Object Free Area[2]	259 FT	320 FT
Taxilane Object Free Area[2]	225 FT	276 FT
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	215 FT	267 FT
Taxiway Centerline to Fixed or Movable Object[3]	129.5 FT	160 FT
Taxilane Centerline to Fixed or Movable Object[3]	112.5 FT	138 FT
Taxiway Wingtip Clearance	44 FT	53 FT
Taxilane Wingtip Clearance	27 FT	31 FT

1. TSA—A clear, graded, and drained area on both sides of a taxiway/taxilane to protect the landing gear in the event of an excursion.
2. Taxiway/Taxilane Object Free Area— An area on both sides of a taxiway/taxilane intended to protect the airplane wing.
3. TDG standards are more critical at GEG when 180 degree turns between parallel taxiways are required.

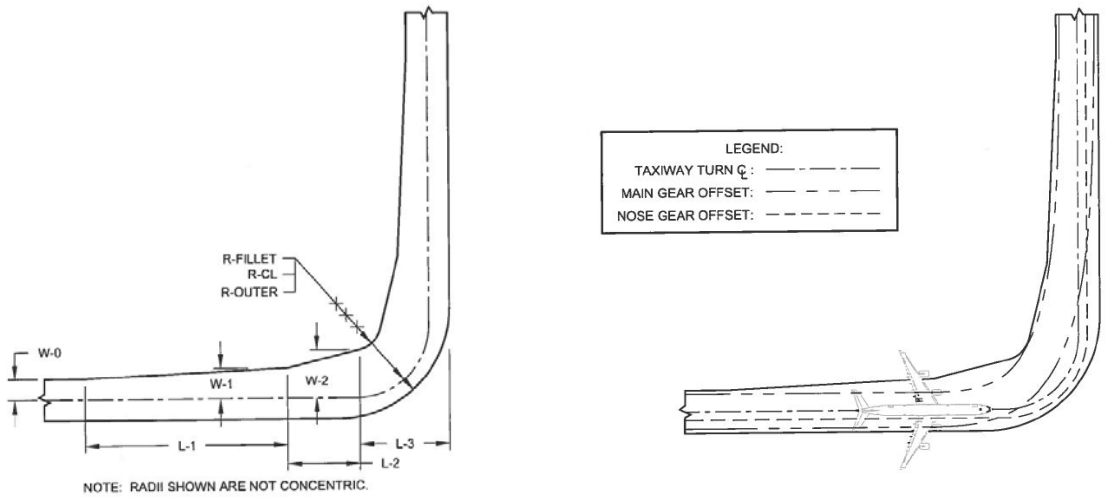
Table 3-14. Taxiway Design Standards based on Taxiway Design Group (TDG)

ITEM	PLANNED: TDG 5	ULTIMATE: TDG 6
Taxiway Width	75 FT	75 FT
Taxiway Edge Safety Margin[1]	15 FT	15 FT
Taxiway Shoulder Width	25 FT	35 FT
Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline[2]	240 FT	350 FT

1. Taxiway Edge Safety Margin— minimum pavement to be provided between the outer edge of the main gear tire and the edge of taxiway/taxilane pavement.
2. The TDG standard is more critical than the corresponding ADG standard when 180 degree turns between parallel taxiways are required.

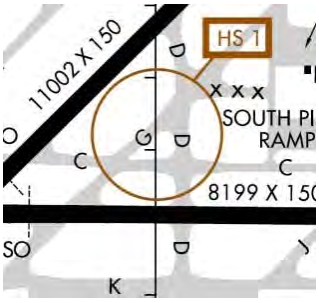
Table 3-15. Standard Intersection Details Based on Taxiway Design Group (TDG)

ITEM	PLANNED/ULTIMATE (TDG 5/6)							
Turn amount (degrees)	30	45	60	90	120	135	150	180
W-0 (FT)	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5
W-1 (FT)	40/46	45/46	45/52	45/56	50/60	50/57	45/55	50/60
W-2 (FT)	52/60	60/71	65/82	65/85	72/95	73/102	73/107	88/105
W-3 (FT)	NA	NA	NA	NA	NA	NA	NA	150/184
L-1 (FT)	100/300	165/300	180/345	180/365	210/400	215/363	180/360	185/395
L-2 (FT)	120/111	90/157	95/137	90/125	70/110	70/145	100/165	90/120
L-3 (FT)	14/16	25/30	37/47	103/129	191/246	276/373	440/594	96/141
R-Fillet (FT)	0	0	0	50/60	50/60	50/60	50/60	35/75
R-CL (FT)	110/150	110/150	110/150	95/130	115/155	120/165	120/170	120/175
R-Outer (FT)	350/400	250/300	200/265	164/200	160/207	160/210	160/212	NA



3.7.2 System Design Principals

*G*round maneuvering at an airport may be confusing due the distances involved, low visibility conditions, precipitation, wet and covered pavement conditions, multiple directional choices, unusual intersection angles, and confusing sign locations and markings. The FAA has design standards and guidelines that have evolved to maximize pilot situational awareness, avoid confusing intersections, and reduce the number of runway incursions. Analysis of the taxiway system at GEG identified existing deficiencies, and provides recommendations to correct them.



- **"Hot Spot" correction**—The triangular configuration formed by the intersection of Taxiways D, C, and G, combined with decommissioned Taxiway H can cause confusion due to the amount of pavement and number of directional choices. The term "Hot Spot" is an FAA designation that is a product of a FAA Runway Safety Area Team (RSAT) evaluation. The RSAT evaluation for GEG identified the Taxiway Hot Spot at an April 26, 2011 meeting, and assigned the tracking number GEG-2011-010 for the situation. Hot Spots appear on taxiway charts used by aircraft operators and are intended to encourage enhanced pilot awareness of potentially confusing operational conditions. Hot Spots are tracked by the FAA with the ultimate goal of funding improvement projects to correct the situation.
- **Direct Apron-Runway Access**—GEG does not have any taxiways directly connecting an apron to a runway; however, several taxiways connect apron to runway across an intervening parallel taxiway. It is recommended that these intersections are decoupled at the parallel taxiway, thereby requiring two turns to enter the runway from an apron.
- **Exit Taxiway Configuration**—GEG has seven exit taxiways that do not conform with either a right-angled or acute-angled exit design standard. It is recommended that these taxiways are reconfigured to comply with the design standard: two will be reconfigured as acute-angled, and the remaining five as will be right-angled. The next sub-section expands on the exit locations and the high-speed (or acute angled) recommendation.

3.7.3 Exit Taxiway Analysis

In addition to correcting non-standard configurations, the exit performance for Runway 3/21 was also considered. Optimally located exit taxiways help reduce runway occupancy time, and should be placed within the deceleration and stop zones for aircraft that frequently use the runway. Sources of information used for this evaluation include ACs 5300-13A 5060-5, input from GEG air traffic controllers and airport operations personnel, and a 2009 FAA Technical Center simulation model.

Discussions with air traffic controllers and airport personnel indicate that many aircraft landing on Runway 21 miss the exits at Taxiways E and D. When missing Taxiway E, aircraft generally come to a near complete stop in order to make the hard turn onto Taxiway D. When missing Taxiways D, aircraft taxi an additional 2,000 feet to exit at Taxiway C. The condition worsens during slippery and wet conditions, and during low visibility conditions as aircraft more frequently miss even the Taxiway C exit, and then cross Runway 7/25 to exit at Taxiway B, which is an additional 2,000 feet down the runway. Each 100 feet of additional taxi distance adds 0.75 seconds of delay to the next aircraft operation, resulting in an additional runway occupancy time of between 15 and 25 seconds for each occurrence. The individual occurrences translate backward along the arrival stream, further delaying aircraft sequenced for landing at GEG and FAFB. The resulting delay increases exponentially with each additional operation in the sequence. Based on these observations, placing and designing taxiways to reduce runway occupancy is an area of focus.

For the aircraft mix at GEG, the optimal location for right-angled exits is between 6,500 and 8,000 feet from the landing threshold with spacing between exits not less than 750 feet apart. The corresponding optimal high-speed exit location is between 5,000 and 5,500 feet. Twelve options consisting of right-angle only and high-speed mix taxiways were explored. These options each corrected the non-standard configurations while also improving exit performance. Collaboration with air traffic control and airport operations staff eliminated options with the following characteristics.

- **X-Pattern**—Options with overlapping high speed exits from opposing directions formed an 'X' pattern. These options were eliminated because of the "sea of pavement" effect, which could be disorienting. Additionally, these options had airplanes exiting onto the parallel taxiway in close proximity to the airline apron connector taxiways, creating a busy environment involving difficult maneuvering via closely-spaced turns.

- **Straight on to Taxiway**—Similar to the X-pattern, the reverse-turn added significant pavement area. The consensus was to apply a "spiral" design that would allow high speed spiral deceleration curve terminating with a right-angled intersection with Taxiway A. The 700-foot separation between Runway 3/21 and parallel Taxiway A is conducive to this design strategy. The terminal apron is position near the ideal exit locations, so there is only a need for a reverse turn onto Taxiway A. Pavement reduction is achieved by eliminating the straight on to taxiway option.

- **Multi-Turn Apron Entrances**—Both sets of right-angled only and mixed high-speed exit options included exits that terminated onto Taxiway A at the terminal entrance connections (Taxiways A1 – A5). These locations were complicated by the desire to decouple the apron to runway connections by avoiding straight-across runway access and the resulting tightly spaced turns that would then be required upon exit. The concept of bracketing the runway exits so as to occur on each side of the busy apron connections was considered more advantageous.

- **Three or More High Speed Taxiways**—The options that limited the number of high speed exits to one per direction and then only onto the west side (Taxiway A) resulted in the least amount of pavement; the right angled-only options all included one or two additional exits. Other options that had more high speeds or more total exits did not significantly reduce runway occupancy-related delay.

Two sets of refined alternatives were carried forward for further analysis: right-angled exit taxiways only, and two high-speed exits. In accordance with FAA policy, the need for a high-speed exit is driven by capacity. The threshold of significance set by the FAA is a throughput demand rate of 30 arrivals per hour during the design hour. GEG exceeded this threshold within the past five years, and is expected to exceed it again in the next five years with up to 41 arrivals forecasted in the design hour by 2030. Following a round-table discussion with representatives from the FAA, GEG tower, and GEG management, the high speed alternative was selected for the following reasons: high speed exits will be justified within the 20-year pavement life-cycle, and because of the reduced number of total exits, the high speed exits will require the least pavement to construct.

While the proposed concept is expected to significantly reduce runway occupancy for Runway End 21 arrivals, the impact for Runway End 3 arrivals is minimal. This is because exit performance onto Taxiway D improved when the runway was extended to the southwest. The high speed recommendation corrects two conditions related to existing Taxiway D: non-standard "Y" configuration and apron-runway connection across Taxiway A. A right-angled exit at the same exit point as the one recommended for the high speed would also provide similar exit performance, but would have two closely-spaced turns needed to enter the apron, increasing taxi time. Terminal bracketing is best achieved through a high speed exit that maintains runway exit performance and then reduces the aircraft maneuvering requirements and taxi time.

3.7.4 Taxiway Recommendations

Taxiway improvement recommendations are shown in **Figure 3-7**.

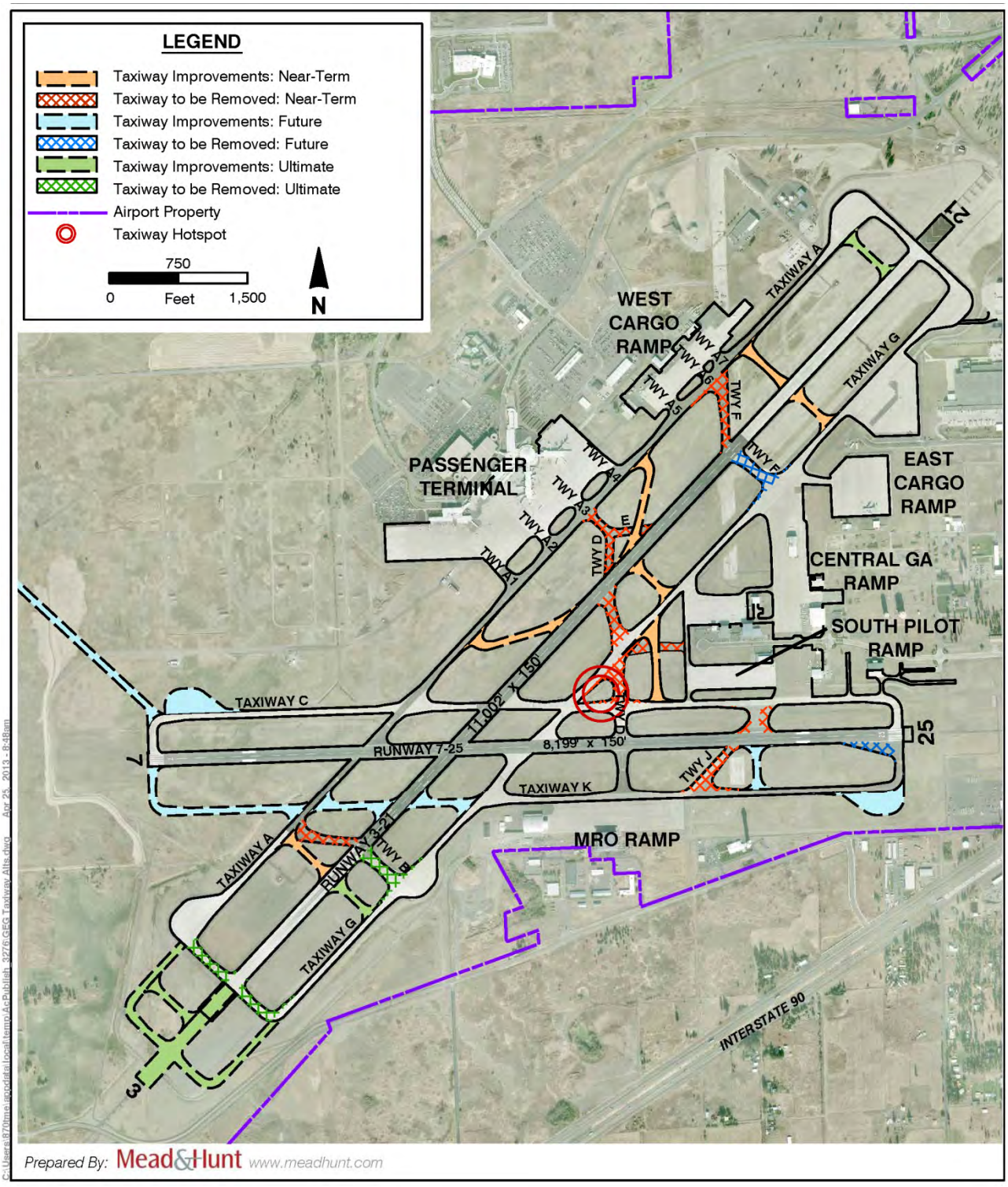


Figure 3-7

Taxiway Improvements

Spokane International Airport

3.8 FUTURE RUNWAY ALTERNATIVES

This section describes the runway development alternatives that have been evaluated. This first set of alternatives compares two alignment options for a new runway on the west side of the Airport. The second set of alternatives evaluates the potential of the new runway as a replacement for Runway 7/25. Current FAA policy supports funding of two runways at airports like GEG. The construction of a third runway would mean that Runway 7/25 would no longer be eligible for FAA funding.

3.8.1 Future Runway Alignment Alternatives

GEG has been planning for a future runway to the west of existing Runway 3/21 for over 30 years. The property necessary to implement the runway is already owned by the Airport; however GEG is planning on acquiring additional property for noise mitigation purposes. Two alternatives have been studied in depth, and are shown in **Figure 3-8**.

- Option A, Parallel to GEG Runway 3/21
- Option B, Parallel to Fairchild Air Force Base (FAFB) Runway 5/23

As described in Section 3.2, the best option for increasing capacity is to develop an independent departure and arrival stream. This can be accomplished by constructing a runway that is parallel to Runway 3/21. However, due to the close proximity between Runway 3/21 at GEG and Runway 5/23 at FAFB, some dependency will remain regardless of the option selected. The 2003 Plan adopted Option B as the preferred alternative; while earlier master plans selected Option A.

In 2009, GEG completed a runway alignment study, included in Appendix A, to determine which of the two runway alignments was the most advantageous for long-range planning, depiction on the ALP, and for local policy and land use protection purposes. The two alternatives scored very closely in the runway alignment study, but two key determinations resulted in the selection of Option A.

- ***Option B impacts to critical base functions and facilities***—These functions (munitions and training centers) would need to relocate or cease operation if Option B were selected. Option A would avoid this impact altogether.
- ***Contingency Scoring***—The alternatives were evaluated against several worst case scenarios. One of those was to consider the possibility of a future closure at FAFB. In this case, Option A, the operating dependency was removed, further enhancing traffic flow at GEG. Option B would retain a dependency indefinitely, likely necessitating realignment to Option A at some point in the future.

2009 3rd Runway Alignment Study

The Executive Summary from this report follows:

Alignment Recommendation

This study recommends that long-term planning and development of Spokane International Airport, Fairchild Air Force Base, and affected municipal and county jurisdictions proceed on the basis that a future 3rd runway will be constructed west of, and parallel to, Spokane's primary Runway 3/21. The other alternative, a similarly placed runway aligned parallel to Fairchild's Runway 5/23, significantly impacted operations and key facilities at Fairchild Air Force Base. On this basis, land use protection controls associated with a future Runway 3/21 alignment should be retained. Protections specifically intended to preserve for a future 5/23 alignment parallel to Fairchild can be lessened or removed. Reduced land use restrictions may allow increased non-aviation development to occur off-airport that will support local socioeconomic growth.

The recommendations summarized in this Executive Summary are based on a comparative assessment of the area's aviation needs, both civil and military. The technical investigations were conducted in a collaborative manner over a period of twelve months involving representatives from various branches of the Federal Aviation Administration, Washington Department of Transportation, Spokane International Airport, Fairchild Air Force Base, and Spokane County. This group reviewed, assessed, and provided valuable input concerning the technical evaluations provided by the Federal Aviation Administration and by Mead & Hunt, Inc.

Related Policy Recommendations

Policy recommendations associated with the selection of a preferred 3rd runway alignment are graphically depicted in the following exhibits. Historically, protections have been in place locally to preserve for either runway alignment. The identification of a preferred alignment enables planners to downgrade airport related development restrictions associated with the non-preferred alternative, in this case, the 5/23 alignment parallel to Fairchild's runway.

Although this study produced a recommendation for a preferred alignment, future conditions could alter the airport's development direction. This is particularly true at Spokane where formalized planning and implementation of the new runway could be five and fifteen years away, depending on actual activity. While the continued protection of two runway alignments may be impractical from a socio-economic development / policy standpoint, this study does recommend a conservative approach for protecting the preferred alignment to allow for future refinements such as runway length and minor differences in the runway end locations. The graphic depiction of the policy recommendations are based on the following:

- Continued preservation of Runway 3/21 alignment; reduced development restrictions for areas associated with 5/23 alignment.

- North runway end of new Runway 3L/21R is fixed per prior investigations and will not extend further north from the previously approved layout plan depicting this alignment.
- South runway end of new Runway 3L/21R is maximized to the south so that a precision approach Runway Protection Zone remains on property currently owned by the airport. Purpose is to protect for longer length or different runway end location than what was evaluated for this study.
- The approach protection areas extending outward from the runway ends assume that the ultimate length of the new 3rd runway will not exceed 10,000 feet, regardless of runway end placement.
- The Airport will look to purchase property beyond planned Runway End 3L for approach protection and land use compatibility purposes. Unlike property beyond planned Runway End 21R which has existing development, this property is undeveloped. It is recommended that the Airport obtain an interest in the property to keep it clear of future development. Acquisition is expected to accommodate the ultimate 65 DNL noise contour, described in **Chapter 6**.

Background

Spokane International Airport has been planning for a new third runway at the location evaluated in this report for over thirty years. Both alignments were subsequently protected due to the uncertainties associated with a 30+ year planning horizon in a dynamic industry and location. In addition, the operational advantages of one alignment over the other were not clear. Over time, Spokane International Airport acquired property and local land use protections for two possible alignments. Meanwhile, the area developed and encroachment occurred. Development pressure continues to intensify and the continued protection for two runways restricts the economic development potential of the area. Lastly, the time horizon to construction has reduced and some of the operating conditions are more clearly understood; however, the air transportation industry and regional growth remain dynamic and difficult to predict with certainty.

Evaluation Summary

The recommendation of a 3/21 alignment is predicated on a detailed comparative assessment of six broad categories comprising thirty individual screening criteria that were weighted and then scored. The six categories include: airspace, airside, landside, environmental, engineering, and impacts to Fairchild Air Force Base. Four of the six categories were nearly evenly scored (two tied). Two categories significantly favored the 3/21 alignment: landside and Fairchild Air Force Base impacts. Alignment 3/21 was ranked more favorably than 5/23 in these categories on the following basis:

- West-field development at Spokane International Airport is less restrictive for Runway 3/21 than 5/23. The difference in reduced west-field development potential is not mitigated by additional mid-field development due to controller line of site and other airport protection surfaces.
- Controller line of site is a greater issue on the 5/23 alignment than 3/21. This includes reduced midfield development potential and also a higher percentage of time the airport would operate in "low visibility flow", due to the extra ¼-mile visibility needed for controllers to see the Runway 5 end compared to the Runway 3L end.
- Fairchild Air Force Base will be more negatively impacted by a 5/23 alignment than a 3/21 alignment. Specifically, a 5-23 alignment would significantly impact Fairchild's south training area, the high altitude drop zone, and the munitions storage facility.
- A separate decision risk assessment also revealed that a 3/21 alignment can accommodate a much wider set of future circumstances and is therefore a safer public investment.

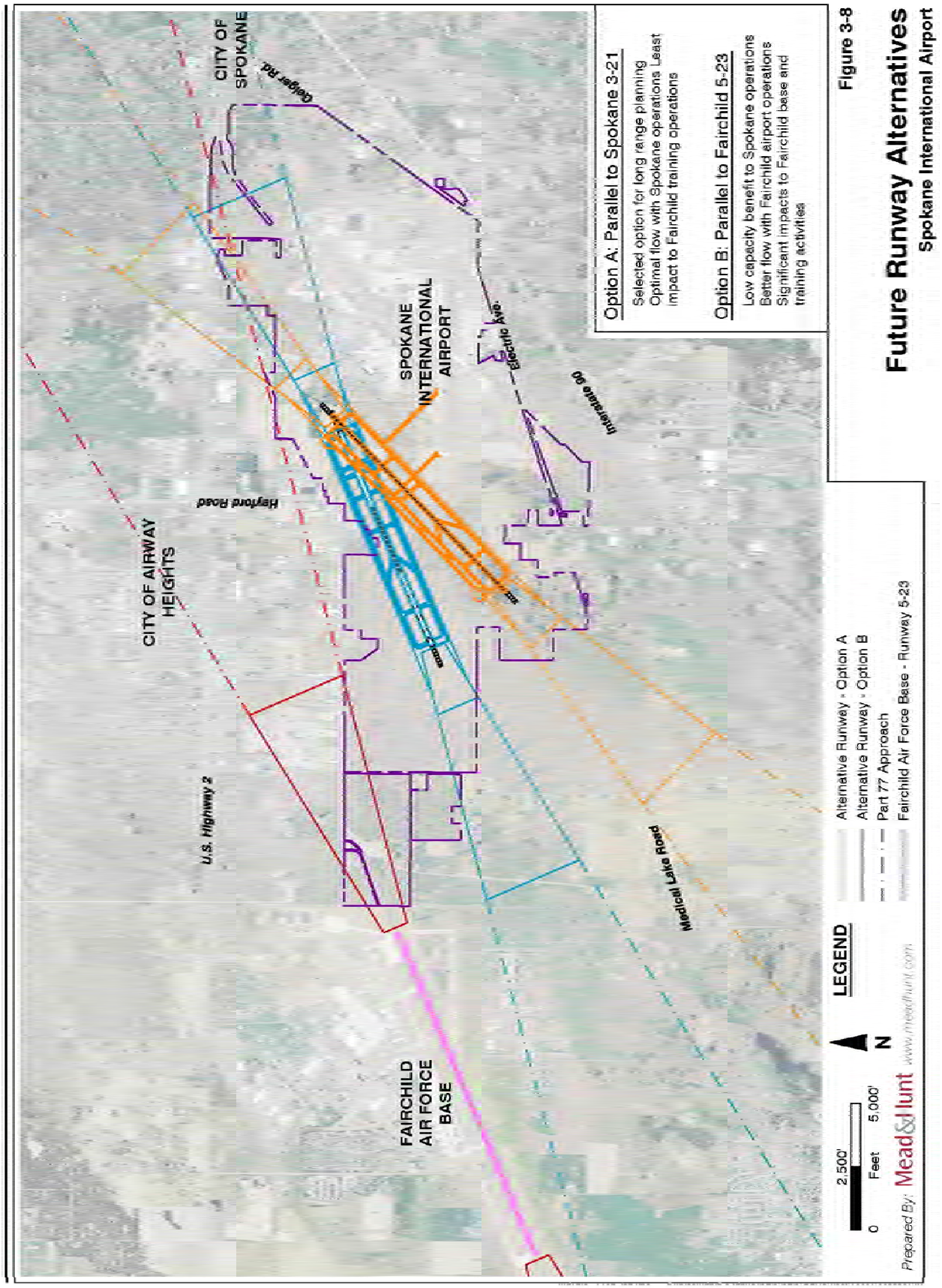


Figure 3-8

Future Runway Alternatives

Spokane International Airport

3.8.2 Disposition of Runway 7/25

After Runway 3L/21R is built, the Airport may consider the option of taking Runway 7/25 out of service; however, the construction of 3L/21R is not expected within the next 20 years. It is expected that Runway 7/25 will continue to provide the Airport with operational flexibility and serve as a backup for existing Runway 3/21 over the next 20 years. The following improvements to Runway 7/25 are recommended to improve its operational utility.

- Improvements to connector and exit taxiways.
- Maintenance of existing approach minimums and land use compatibility efforts.
- Land use controls at the approach end of each runway to protect critical approach airspace.
- Scheduled pavement rehabilitation to maintain the existing pavement strength.

After Runway 3L/21R is constructed, there are two options for the future of Runway 7/25.

- **Option A**: Retain Runway 7/25 after construction of Runway 3L/21R with improvements during 20-year planning horizon.

An advantage associated with the Option A is that it would continue to serve its existing functions as a crosswind alternative for smaller aircraft, and enhancing capacity and operational flexibility.

- **Option B**: Construct Runway 3L/21R and decommission Runway 7/25.

An advantage associated with the Option B is that the resulting airport configuration removes development restrictions, thus allowing a more efficient use of airport property for aviation and aviation-related development. Such an arrangement may further enhance GEG's potential to attract MRO and aviation manufacturing to the airport, and the operational flow of aircraft would also be greatly improved.

Ultimately, a final decision on whether to retain or decommission Runway 7/25 will be made after Runway 3L/21R becomes fully operational.

Options A and B are shown in **Figure 3-9**.

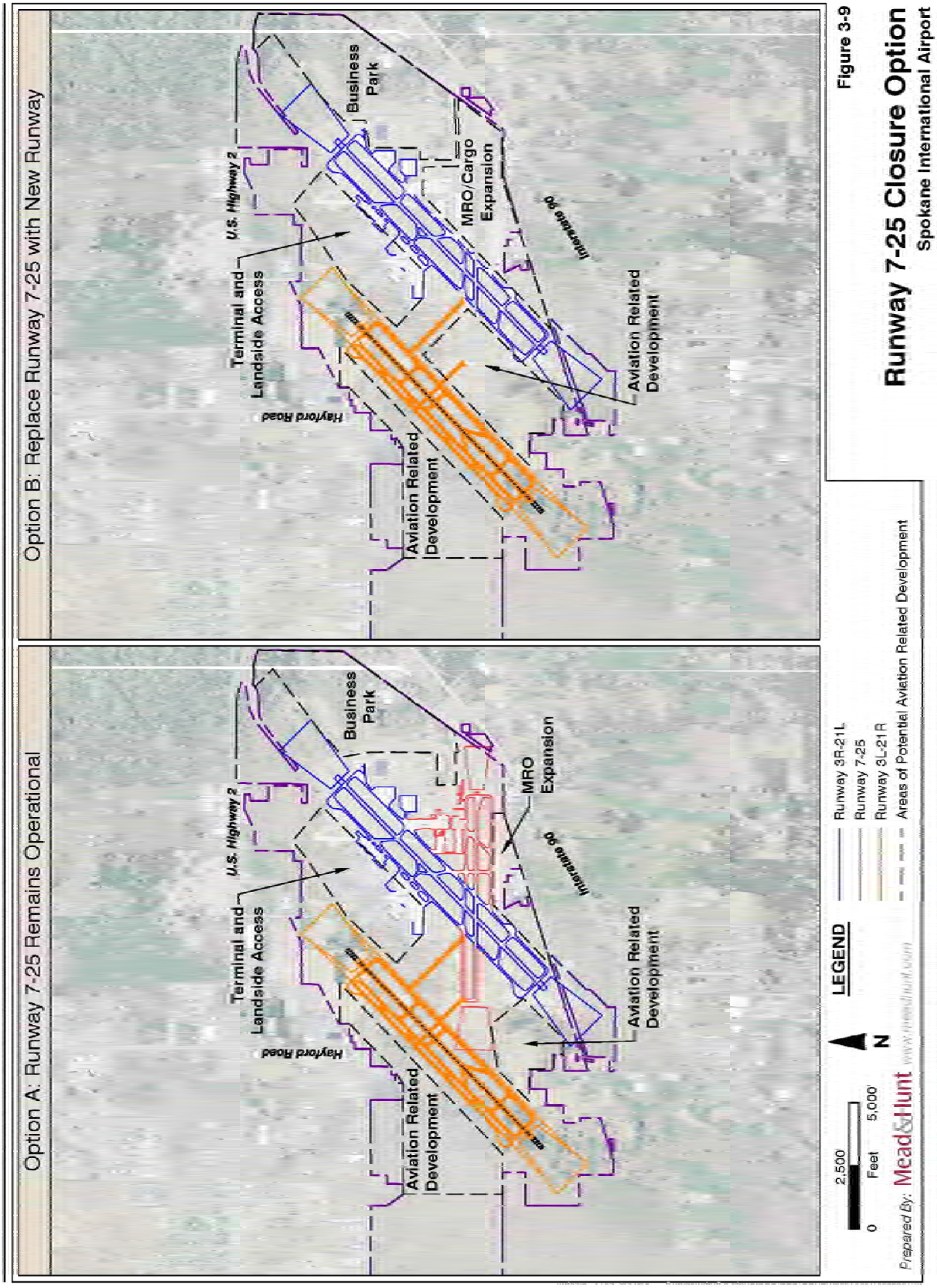


Figure 3-9

Runway 7-25 Closure Option

Spokane International Airport

3.9 AIRPORT SUPPORT FACILITIES

This section details additional airfield facilities that may be required over the next 20 years.

3.9.1 Airport Rescue and Fire Fighting (ARFF) Station

GEG is certified under 14 CFR Part 139; therefore, it must comply with ARFF equipment, staff, and operational requirements that were developed by the FAA and the International Civil Aviation Organization Rescue and Fire Fighting Panel. According to Part 139, ARFF equipment and staff requirements are based upon the length of the largest air carrier aircraft that serves an airport with an average of five or more daily departures. **Table 3-16** presents the ARFF Index, aircraft length criteria, and representative air carrier aircraft. In 2013, GEG maintained an ARFF Index B classification.

Table 3-16. ARFF Index Requirements

ARFF Index	Aircraft Length Criteria	Representative Aircraft
A	Less than 90 feet	CRJ-200
B	90 feet but less than 126 feet	B-737, A-320, ERJ-145
C	126 feet but less than 159 feet	B-757, MD-80, A-310
D	159 feet but less than 200 feet	B-767, DC-10
E	More than 200 feet	B-747, A-380

ARFF operational requirements specify that at least one ARFF vehicle at its assigned post be able to reach the midpoint of the farthest runway serving air carrier aircraft within three minutes from the time of alarm to the time of initial fire extinguishing agent application. All other required vehicles must reach this same point within four minutes of the time of alarm. The existing ARFF facility, located northeast of the airline terminal, meets these operational requirements. However, building and system maintenance are increasing as the facility has reaches its economic life. A new facility is recommended that can be expanded based on needs at GEG and new regulatory requirements in the future, and can provide emergency response to Runway 3L/21R.

As shown in **Figure 3-10**, three sites were evaluated for a new ARFF facility. The primary screening criteria was response time. To estimate response time, critical points were established at the runway mid-point of both the existing and future runways. Response times were estimated using a direct paved route between the proposed site and the critical point and applying an average speed of 35 miles per hour. Additional criteria included a location closer to the terminal facilities and not restricting the development of other aviation facilities. The results of the analysis are described below.

- **Site A, *Expand Existing Site*—**Site A is located near the terminal and meets the response requirements for the existing airfield, but not the new runway. There is no significant impact to planned development, although the Airport wishes to locate a maintenance center in that location. Expanding the existing site to maintain response capability would be difficult due to existing constraints.

		Existing Runways		Ultimate Runways	
Existing Site		3-21	7-25	3R-21L	3L-21R
A East Area	Length (feet)	2,500	4,200	3,100	9,900
	Time (Minutes:seconds)	0:49	1:22	1:01	3:13
B	Length (feet)	2,560	3,130	2,950	10,050
	Time (Minutes:seconds)	0:50	1:01	0:58	3:16
Midfield C	Length (feet)	2,760	2,980	2,240	5,480
	Time (Minutes:seconds)	0:54	0:58	0:44	1:47

Note: Times calculated to nearest minute using average vehicle speed of 35 MPH

Figure 3-10

ARFF Alternative Locations

Spokane International Airport

- **Site B, *East Area*—**Site B provides satisfactory response to existing airfield, but not the future runway. Site B is located at an area that is largely restricted from large hangar development due to controller line of sight concerns. Site B is separated from the terminal building by Runway 3/21, which is less desirable for responding to emergencies at the terminal building.

- **Site C, *Midfield (Recommended)*—**Provides best response time to new runway. Site C is located in close proximity to the terminal building and also offers adequate response to the existing runways. The area is also located within the midfield-area that will be reserved for the expansion of terminal facilities. The north and south side of the facility would be equipped with doors for quicker response times in each direction.

3.9.2 Fuel Facilities

The fuel farm facility is located on the north ramp, west of the Runway End 21 landing threshold. Stored fuel types include Jet A, 100 low lead, and 100. Fuel is trucked into the facility via Gate K. Fuel service trucks provide fuel to aircraft on the terminal, cargo, or FBO aprons. No self-serving fuel pumps are located on the Airport. The fuel facility has two vacant tank positions that can be activated if additional capacity is necessary. It is proposed that the fuel farm facility be expanded to accommodate another jet fuel tank.

An underground petroleum line traverses the Airport, starting near Runway End 25 and running to Airport Drive. In the future, it may be possible to convert this line to serve aircraft or aviation related vehicles.

GEG is a strong supporter of promoting the use alternative fuels for civil aviation use, and is currently investigating opportunities of locating a bio-fuel refining site in the airport business park within the East Area of the Airport. According to information contained in Airport Cooperative Research Program (ACRP) Report 83, *Assessing Opportunities for Alternative Fuel Distribution Programs*, alternative fuels for use at airports can be grouped into two categories.

- Alternative jet fuels (two formulations have currently been approved as a "drop-in" fuel that can be mixed with conventional jet fuel up to a 50:50 ratio and be stored/distributed using conventional equipment).
- Alternative fuels used for surface transportation (e.g., biodiesel blended, ethanol blended, compressed natural gas, liquefied petroleum gas, and electricity) are directed at all support vehicles that are used on the airfield.

Overall, the use of alternative fuels at airports offer a variety of economic, operational, and environmental benefits that include diversification of fuel sources; improving reliability and security of fuel supply; reduction of fuel price volatility; providing regional economic benefits; and reducing the Airport's environmental footprint. In addition, ACRP Report 83 includes a case study example of the planning process undertaken by Hartsfield-Jackson Atlanta International Airport (ATL) to evaluate the potential development of a 39-acre "Energy Park" on airport property for the on-site production and distribution of alternative fuels.

3.9.3 Airfield Maintenance Center

The airfield maintenance building is located on the north ramp, north of the cargo facilities. This 50,000 square foot building houses a repair area, snow removal equipment, mowers, and other heavy equipment used to keep the airfield clear and operational. This plan recommends the development of a maintenance center campus to provide administrative space to support the maintenance function. When the ARFF is relocated, the existing ARFF building can be renovated and converted into a maintenance administrative center.

3.9.4 Snow Removal and Aircraft Deicing

Winter operations at GEG can be significant involving the sequenced plowing of runways, taxiways, and terminal apron. Snow removal operations dramatically increase the number of vehicles and equipment within the airport operating area. Many of these procedures occur during periods when GEG is also operating under IMC and PVC conditions. Because the piled snow will often create an obstruction or limit visibility at intersections, the snow must often be loaded and stored further away from aircraft movement.

When significant amount of snow falls on the Airport, snow removal equipment vehicles clear the active airfield pavement to help maintain the scheduled flow of aircraft operations. This involves plowing snow to a pile, loading to a truck, and hauling to remote area to melt naturally. At GEG, the additional space between runways and taxiways as well as the availability of vacant land is helpful for clearing operations.

Deicing of aircraft is a necessary prior to departures during cold weather. **Figure 3-11** identifies three potential locations that should be reserved for future deicing operations. Site A was selected based on potential terminal expansion, and provides a central location for aircraft that may depart on either of the existing runways, or the proposed runway. Site B proposes redevelopment of the existing ARFF development area in the 10-year time period. Site C proposes an eastside deicing facility for general aviation and air cargo aircraft at the north end of the central GA ramp. A separate study is being conducted to prepare detailed layout and phasing of the deicing facilities.

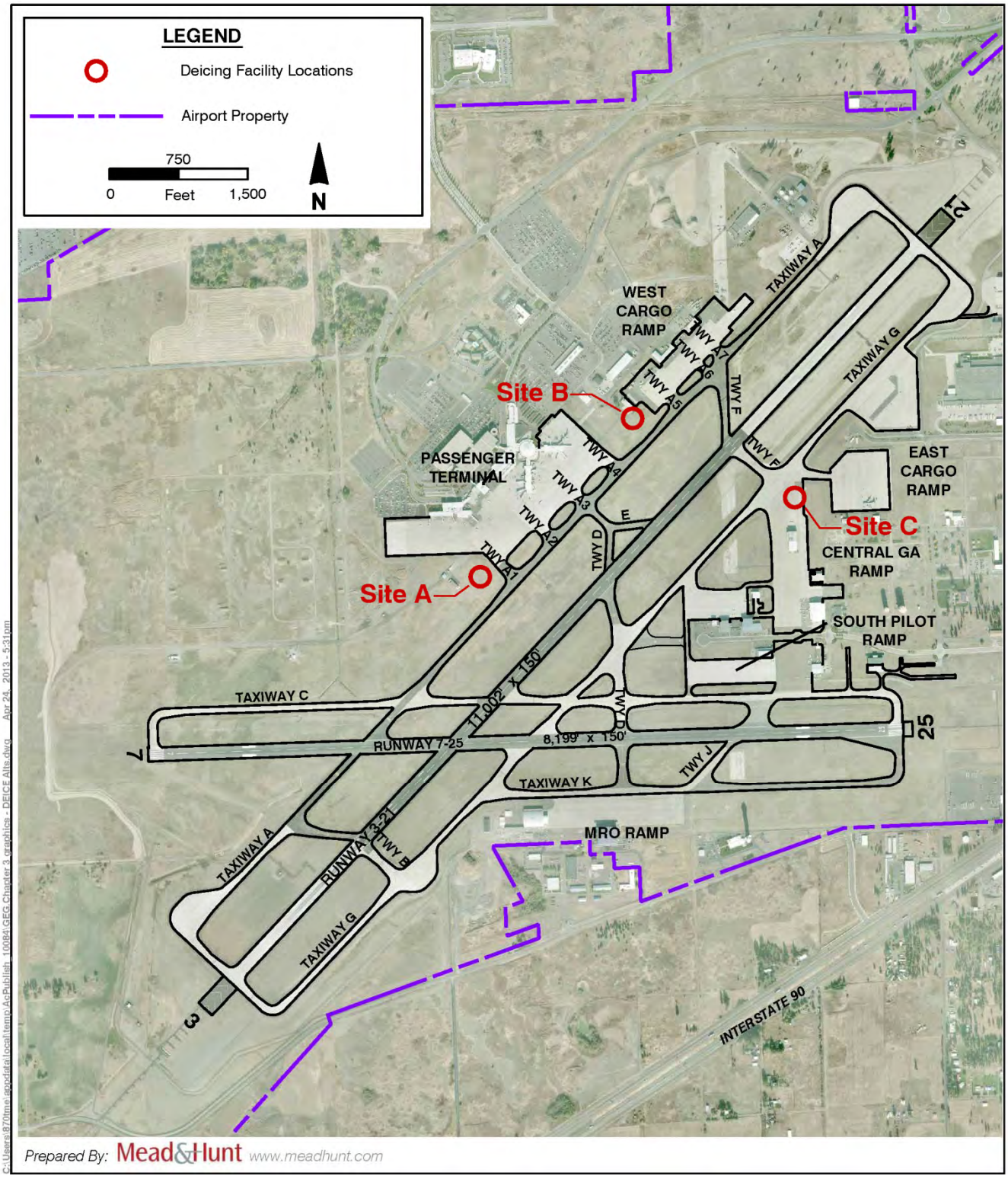


Figure 3-11

Deicing Facility Locations
Spokane International Airport

3.9.5 Customs Facilities

The existing U.S. Customs and Border Patrol (USCBP) facility is located on the Airport's east side GA apron. Because of the limited available apron space and the strength of the pavement, the facility can only accommodate charter flights of aircraft seating less than 30 people. Based on the Airport's estimates and interviews with USCBP staff, there is a need to at least double the size of this facility. The existing facility does not meet USCBP standards. Facility upgrades should be to USCBP standards. Options considered included doubling the size of the existing facility at its existing location and strengthening the apron; moving to a new location either on the east side or the west side near the terminal, or including customs facilities into future terminal building improvements. These options will be explored in further detail and further coordination with the Transportation Security Administration and USCBP representatives will be conducted. The preferred alternative is providing an expanded facility just east of the present location, as shown on Figures 3-19 and 3-20 later in this chapter.

3.9.6 Air Traffic Control Tower (ATCT)

The ATCT is located on the Airport's south side, east of the south maintenance apron. The ATCT was recently constructed and is considered a state-of-the-art facility. Because of this, relocating or replacing the tower within the 20-year planning period is not recommended.

With the ultimate expansion of the Airport, terminal, and the potential for a 3rd runway parallel to Runway 3-21 west of the existing terminal, there may be a need to relocate the ATCT. A detailed site selection study will be conducted prior to relocation but for the purposes of this Master Plan, it was determined that a 'placeholder' midfield terminal be introduced to help identify the possibility for relocation when the following conditions are met:

- Construction of the midfield terminal.
- Completion of the 3rd runway parallel to Runway 3-21.
- Full build-out of the Airport.
- The lifespan of the existing tower is nearing an end.

Once these conditions are met then it will be practicable for a relocated tower. The following benefits would be realized at a midfield location:

- The line of site to the north end of Runway 3/21 and Taxiway G restricts building development on the entire airport's east side, a primary area for accommodating MRO and cargo growth.

- The line of site to the north end of planned Runway 3L/21R and associated taxiways restricts terminal building and garage parking expansion of a future mid-field terminal and also expansion of the existing terminal configuration.
- The distance to the south end of planned Runway End 3L is far away and does not meet current depth perception standards. The method for calculating depth perception has changed since the existing ATCT was constructed; and the ATCT met the standard in place at the time of its design, but does not meet the existing standard. The distance between the ATCT and the planned Runway End 3L will result in an earlier than normal shift to instrument operations during lower visibility conditions since the planned runway end will be more than a mile away. This will translate into reduced operational flow on that runway during lower visibility conditions.

Careful effort should be taken in the planning and site selection for a new ATCT facility. Proper lead time should be given for specific site selection, environmental reports and construction. The ultimate vision of the Airport includes a relocation of the ATCT to a midfield location.

3.10 BUILDING AREAS

Four building areas will support non-airline aviation needs and strategic goals at GEG: the North Cargo Area, South Area, East Area and West Area.

3.10.1 North Cargo Area

The North Cargo Area comprises the buildings and apron that are located directly north of the terminal and west of the approach end to Runway 21. Included in the North Cargo Area are cargo facilities, the ARFF, the fuel farm and glycol storage, airport maintenance and snow removal equipment buildings and other ancillary facilities.

As with most cargo centers, the cargo aircraft fleet usually arrive and depart at the same time to ensure delivery schedules. Because of this, the apron can get congested when freighters convene on this area in the early morning. Additionally, the apron is generally too small to accommodate multiple parked freighter aircraft loading and unloading cargo while other aircraft taxi on and off of Taxiway G. This coupled with antiquated buildings triggered the need for this area to be considered for alternative layouts. The North Cargo Area will continue to be optimal for cargo operations if it is expanded to the west at the end of life of the current facilities.

Two alternative layouts to the North Cargo Area are illustrated in **Figures 3-12** and **3-13**. Each alternative shows an expanded cargo apron, new buildings, an access road for tractor tailors, plus an expanded apron to the southwest that connects to the air carrier apron. Alternative 1 takes into account a potential relocated Airport Drive, provides warehouse facilities with 140,000 square feet of floor area, and parking for 3 777-200s, 4 A310s and multiple smaller cargo aircraft.

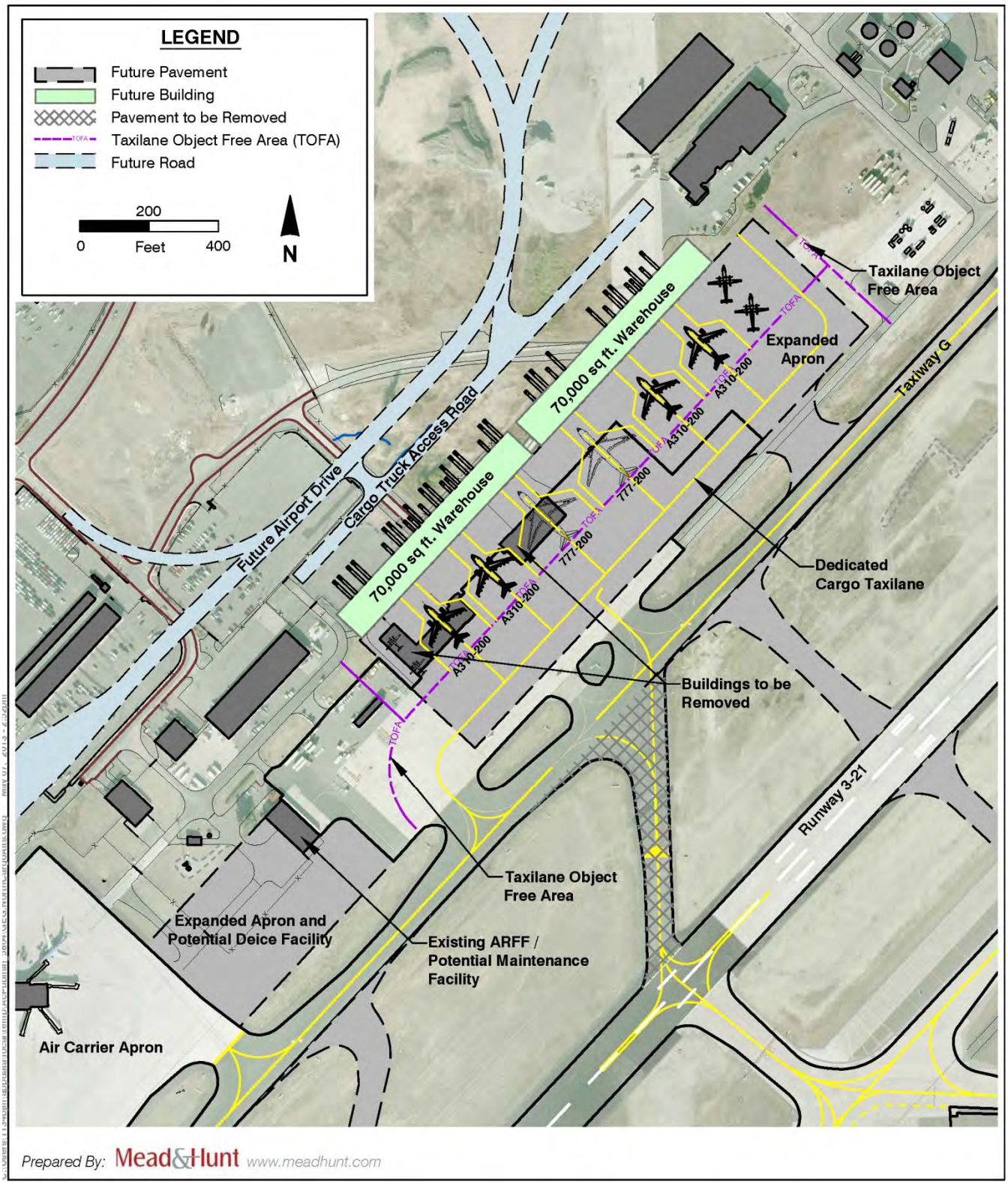


Figure 3-12

North Cargo Area: Alternative 1

Spokane International Airport

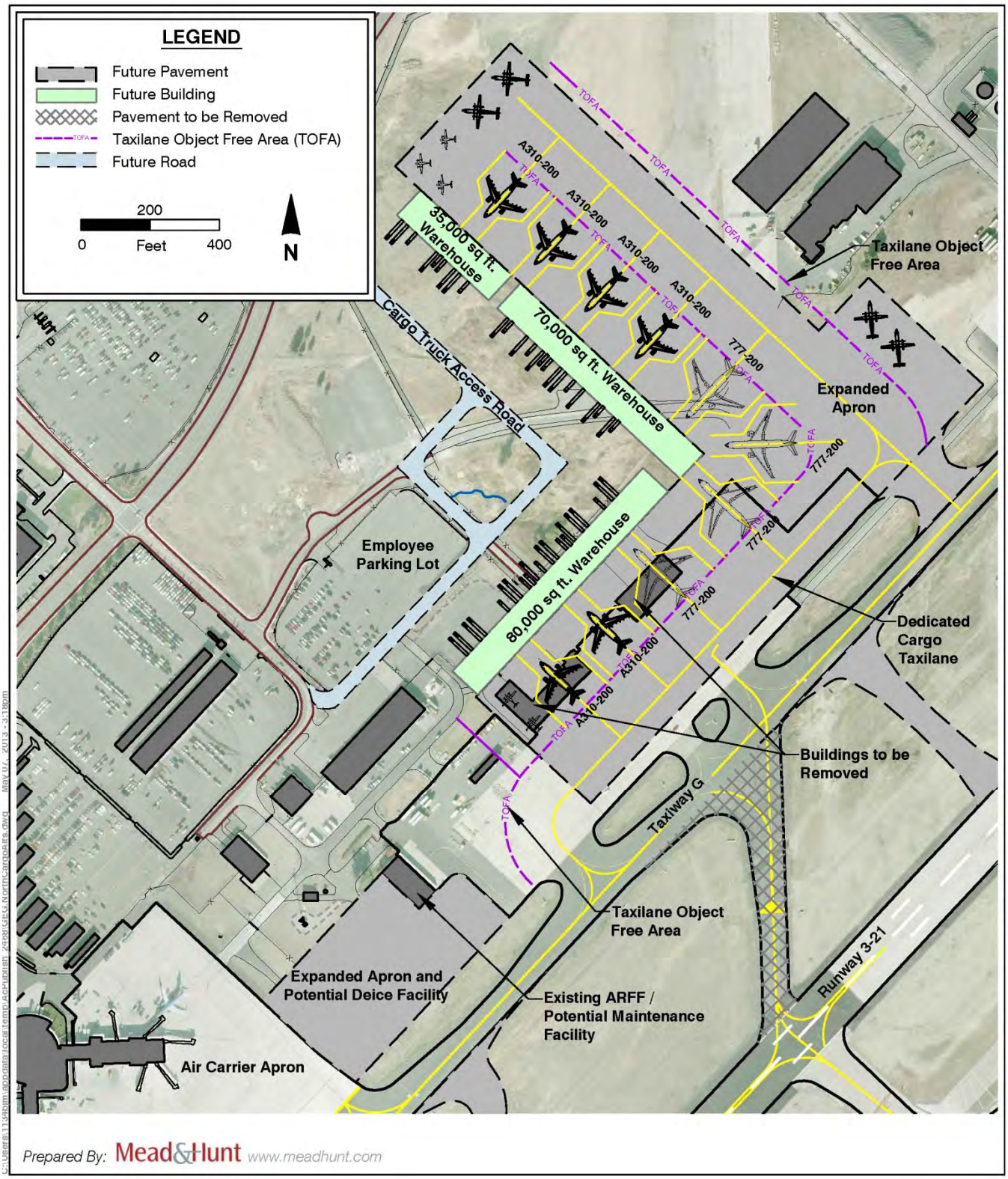


Figure 3-13

North Cargo Area: Alternative 2

Spokane International Airport

Alternative 2 provides more warehouses, a total of 185,000 square feet of floor space, and additional aircraft parking. Parking is considered for 4 777-200s and 6 A319s. The drawback to Alternative 2 is it may not allow for the relocation of Airport Drive in its proposed configuration (See Chapter 5).

Discussions on construction a dedicated deice facility, relocating the ARFF and expanding the fuel farm were provided previously in this Chapter. Both alternatives incorporate the potential expansion of each facility in this area.

Alternative 1 is preferred since this layout considers the relocated Airport Drive. While Alternative 2 does provide greater area for aircraft parking and warehouse space, it is expected that Alternative 1 will provide the apron space and building area that will meet the demands of cargo activity in the intermediate term.

3.10.2 South Area

The South Area is often identified as the MRO Ramp. Two MRO facilities presently exist, and an expansion is under discussion. Airport management is actively targeting opportunities to consolidate MRO development at GEG. A portion of the South Area is owned and occupied by the Army National Guard (ANG). Several alternative layouts to accommodate MRO expansion were assessed and are presented in **Figures 3-14**, **3-15**, and **3-16**. The ability for GEG to acquire the ANG property effects the overall development of the South Area. Relocation of Electric Avenue and additional property acquisition may permit further expansion. With the relocation of Electric Avenue, the South Area may also offer potential as an aircraft manufacturing site (**Figure 3-17**). (Closing Runway 7/25 would also significantly reduce development constraints.)

The south side has the following development constraints:

- ***Part 77 Height Limitations***—The Part 77 surfaces and corresponding height restrictions associated with Runway 7/25 have increased since the 2003 Plan was prepared. The Part 77 surfaces move the height limitations south 250 feet toward Electric Avenue. For example a 35-foot tall building now needs to be set back 745 feet from the runway centerline instead of 495 feet as was required when the 2003 Plan was prepared. The change is the result the LPV approach procedure to Runway End 7 having approach ¾ mile visibility minimums.

- ***Location of Existing Facilities and Infrastructure***—The location of existing hangar facilities and leased areas combined with utility location also influences the layout of the site. Additionally, independent projects have identified limitations with the capacity of existing utilities in this area. Upgrades and improvements to the utilities may be necessary for large scale development of MRO and aircraft manufacturing facilities.

Alternative 3 is the preferred alternative based on the desire of airport management to maximize the use of existing utilities and infrastructure and maintain flexibility of development options.

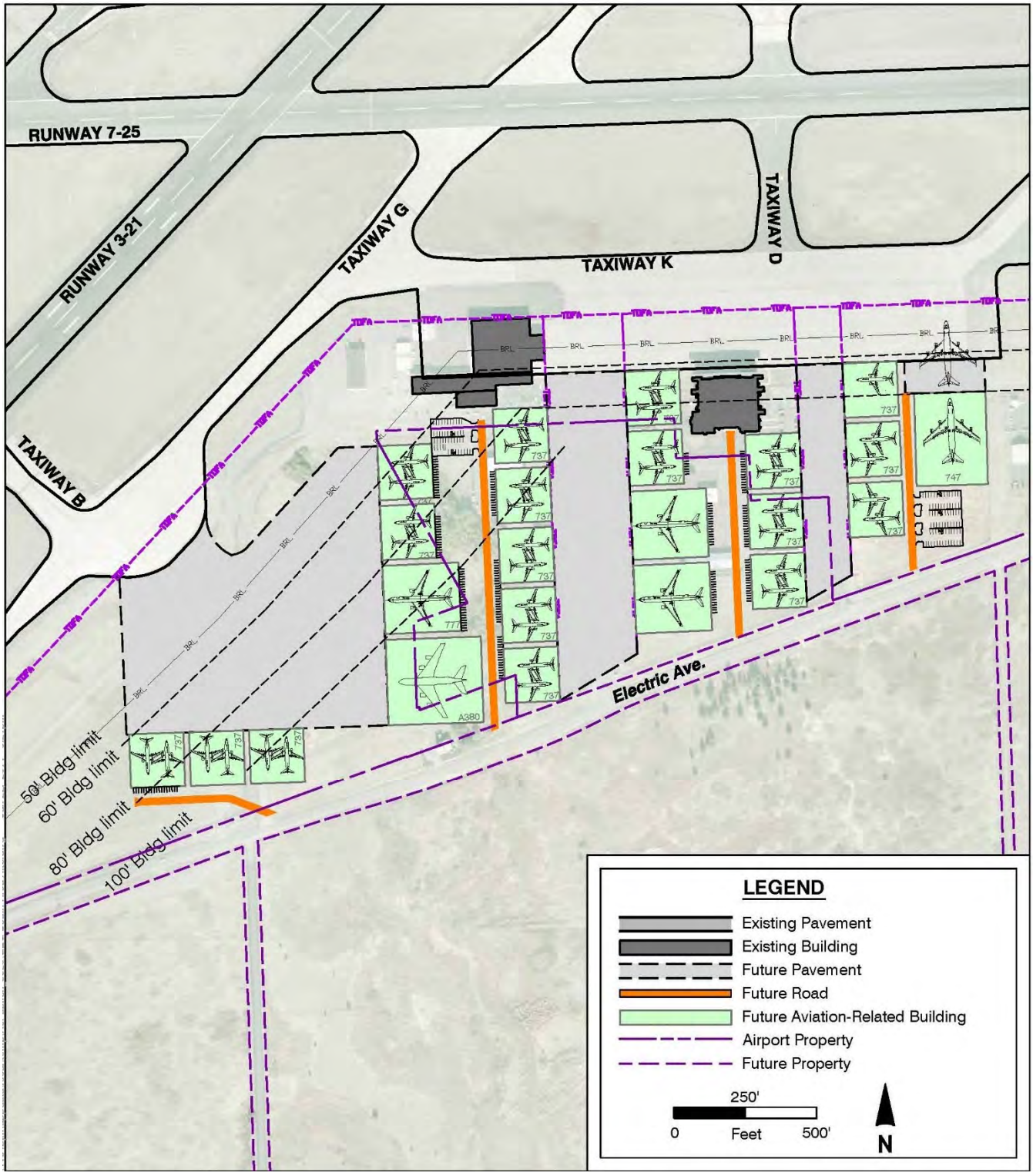


Figure 3-14

South Area Development: Alternative 1 – Not Preferred

Spokane International Airport

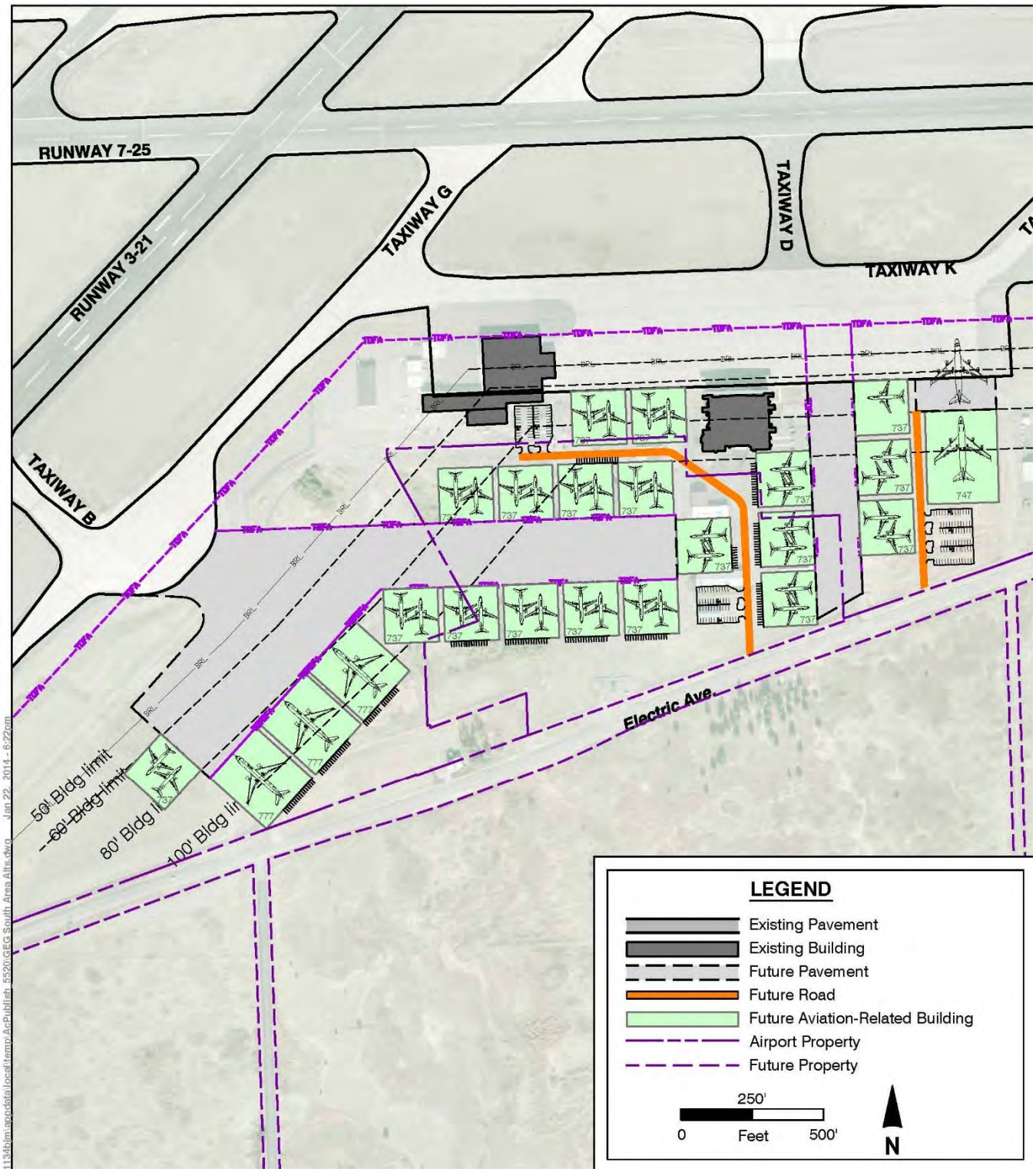


Figure 3-15

South Area Development: Alternative 2 – Not Preferred

Spokane International Airport

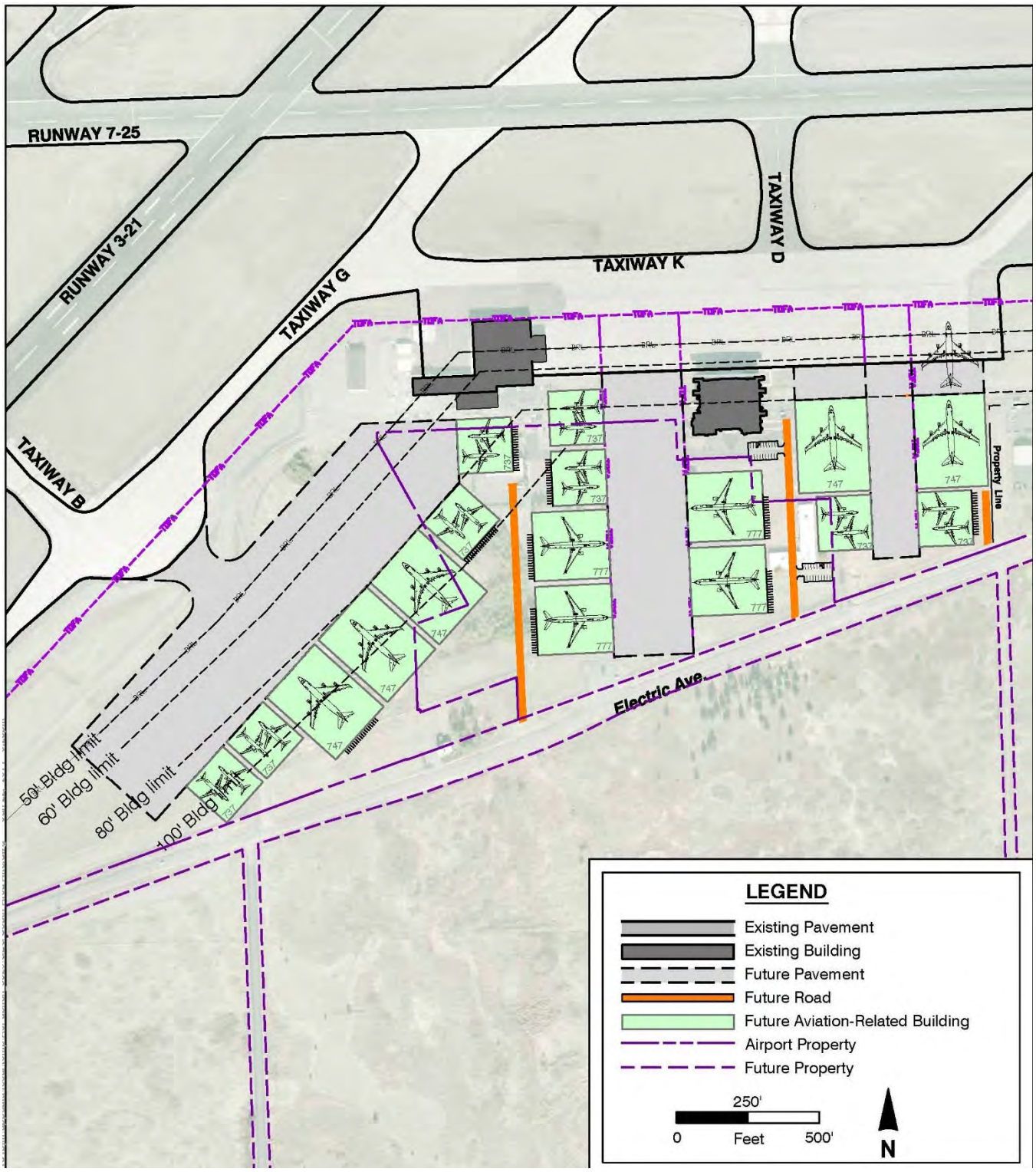


Figure 3-16

South Area Development: Alternative 3 - Preferred

Spokane International Airport

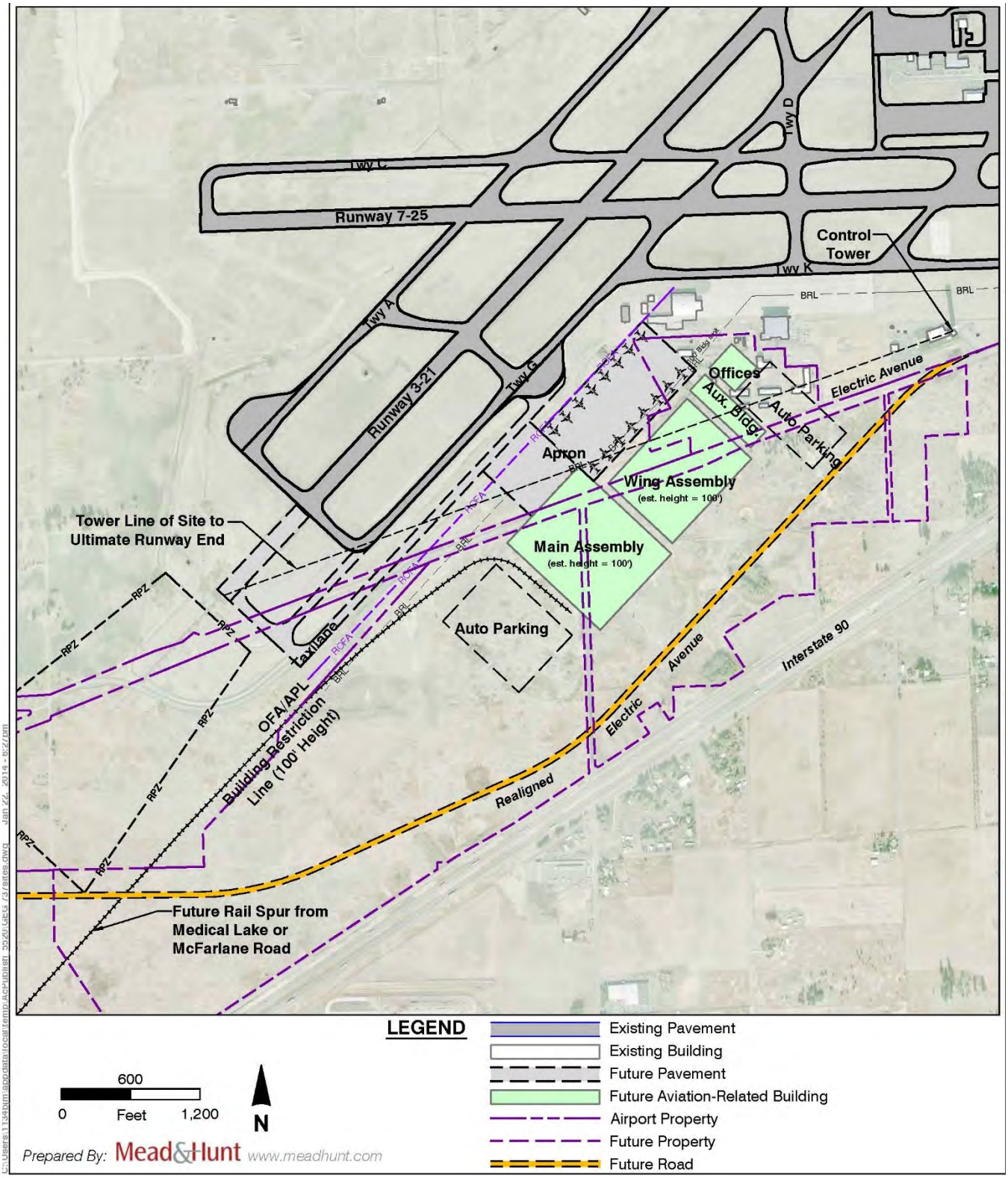


Figure 3-17

Manufacturing Development: South Site

Spokane International Airport

3.10.3 West Area

The West Area offers opportunity to be developed as an aircraft manufacturing site. The area is large enough to accommodate a significant operation with road, rail, and airport access. The west manufacturing site would benefit from the development of planned Runway 3L/21R. However, depending on the timing of the new runway and the need for airside access, the site could be developed initially with an interim taxiway connecting the site to the existing airport infrastructure. Such a taxiway would ideally be constructed so as to function with the new runway. The implications to crossing Hayford Road would also need to be assessed relative to the timing of the runway implementation work. A new runway will require the realignment or tunneling of Hayford Road. The west side of the airport offers long-term potential to accommodate further expansion of aircraft manufacturing or MRO-support services and other aviation-related activities. **Figure 3-18** illustrates the conceptual development plan for this area.

3.10.4 East Area

Existing East Area development includes two large aircraft parking aprons, the GA ramp, U.S. Customs, a U.S. postal facility, and the Airport Business Park. Vertical development of the northern portion of the site is limited by ATCT line of site with the north end of Taxiway G. The U.S. postal facility will be converted to aviation use should the Post Office discontinue operations at that location. Potential development envisioned for the East Area includes air cargo facility expansion, MRO facility expansion, U.S. Customs expansion, and potential GA facilities. Aviation-compatible business and industrial development will continue east of the aviation/non-aviation line. (The relocation of the ATCT to the mid-field will greatly enhance the development potential of the East Area, as would the closure of Runway 7/25.)

The East Area has sufficient apron infrastructure to accommodate regular use by large airplanes that may frequent cargo and MRO facilities. Controller line of sight places height restrictions on buildings, particularly on the northern portion of the site. The presence of existing facilities such as the paved apron areas, FBOs, and Postal Service facility influence functionality and development costs to prepare the site. **Figures 3-19** and **3-20** illustrate two development scenarios for the East Area.

Alternative 2 is the preferred alternative because it maximizes that amount of cargo buildings adjacent the cargo apron while providing flexibility to meet unknown development needs.

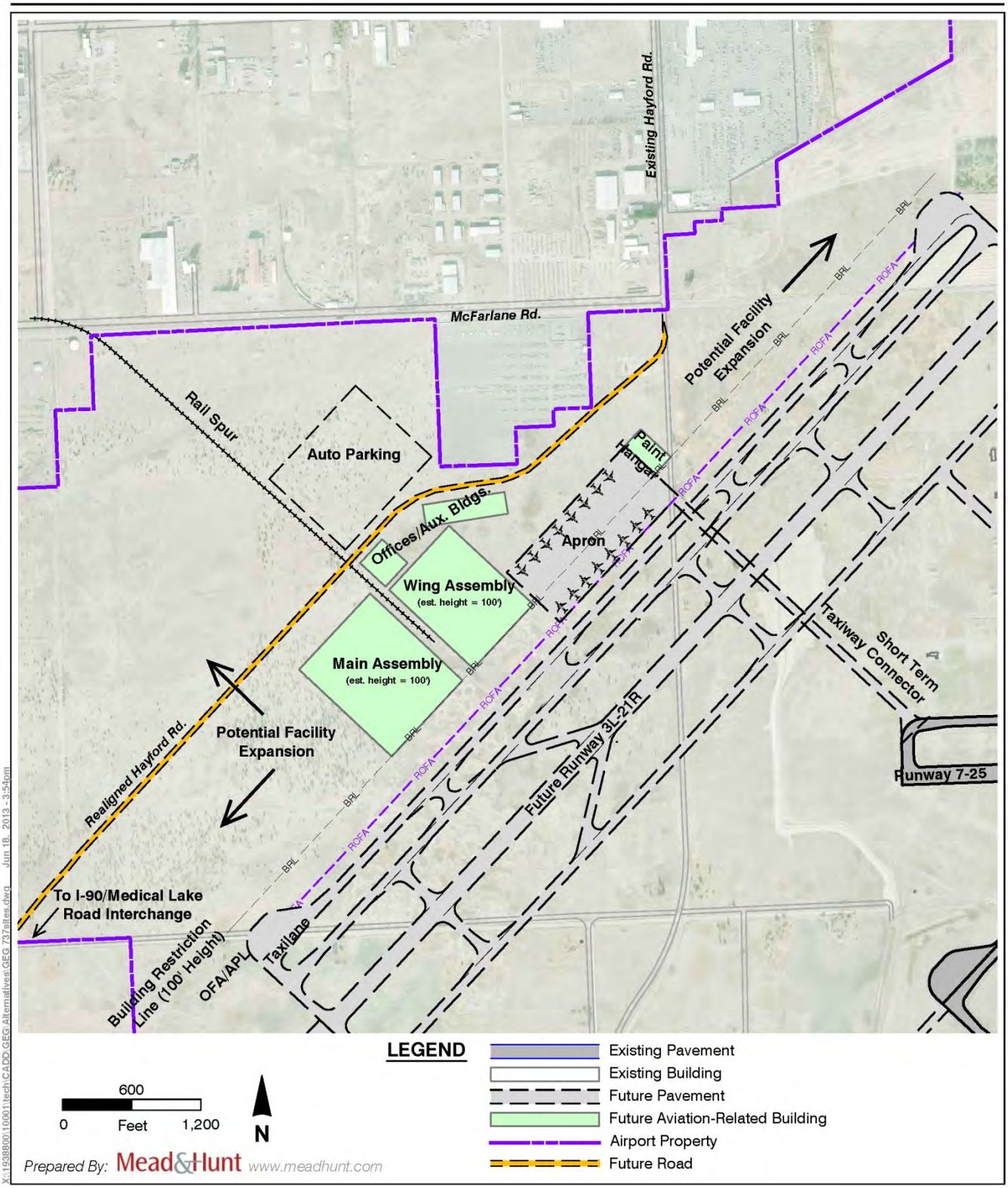


Figure 3-18

Manufacturing Development: West Site

Spokane International Airport

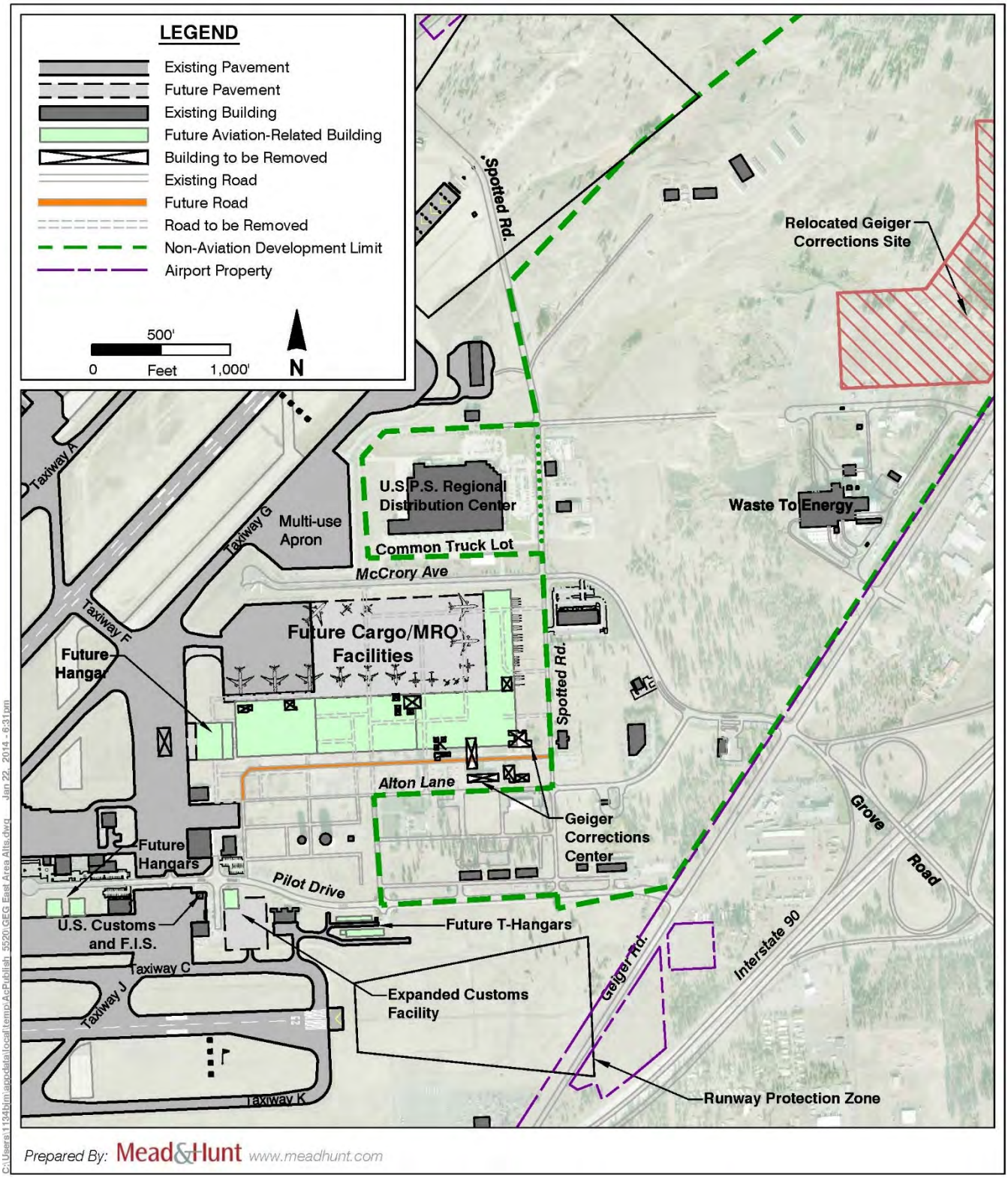


Figure 3-19

East Area Development: Alternative 1 – Not Preferred

Spokane International Airport

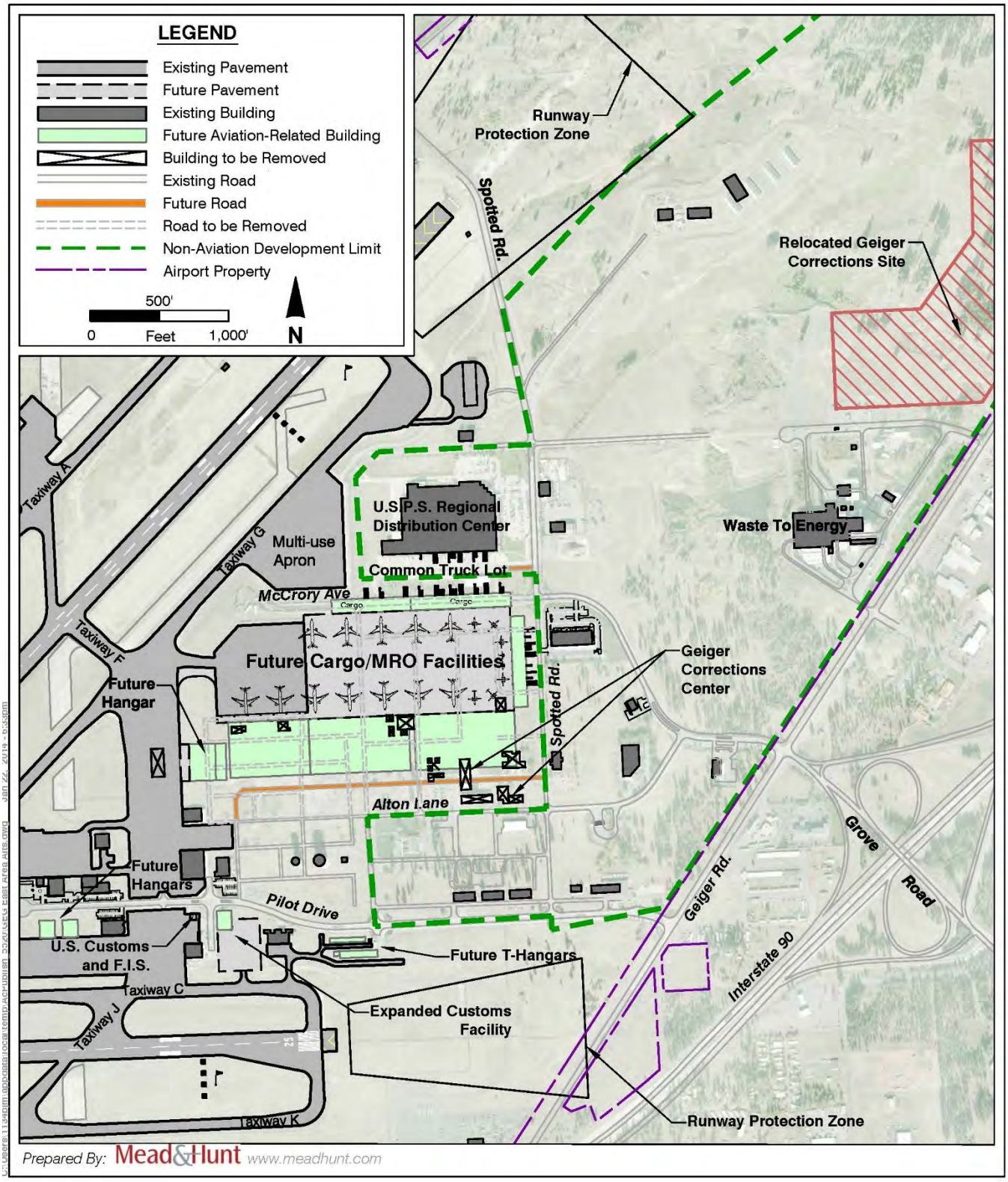


Figure 3-20

East Area Development: Alternative 2 - Preferred

Spokane International Airport

3.11 ULTIMATE AIRFIELD VISION

GEG Staff have been presented with a variety of facility expansion options to support the ultimate airport vision for long-term development. Following an assessment of the potential impacts of the proposals for each development issue, in conjunction with a detailed FAA evaluation, the Airport has selected components of a recommended *Conceptual Development Plan*, which are presented in **Figure 3-21**, and which will be presented in the *Airport Plans* chapter of this document to represent the ultimate airport configuration. The ultimate build-out of the various airside development areas on the Airport will be demand driven and likely far exceed that which is projected for the 20-year planning horizon. However, airport property is largely sufficient to meet the needs of the future, and additional property or property rights to be acquired have been included.

A summary of the recommendations described by the ultimate airfield vision for GEG is presented in **Table 3-17**.

Table 3-17. Facility Requirements Summary[1]

Facility	Existing	Future	Ultimate
Runway Dimensional Standards (RDC)			
Runway 3/21 (3R and 21L Ultimate)	D-IV	same	D-V
Runway 7/25	C-III	same	C-III[2]
Runway 3L/21R	—	—	D-V
Taxiway Dimensional Standards (TDG)			
Runway 3/21 Taxiway System	TDG-5	TDG-6	TDG-6
Runway 7/25 Taxiway System	TDG-5	same	same[2]
Runway 3L/21R Taxiway System	—	—	TDG-6
Runway Length/Width			
Runway 3/21 (3R and 21L Ultimate)	11,002' x 150'	same	12,000' x 150'
Runway 7/25	8,199' x 150'	same	same[2]
Runway 3L/21R	—	—	9,000' x 150'
Instrument Approach Visibility Mins.			
Runway 3 and 21 (3R and 21L Ultimate)	<1/2-mile	same	same
Runway 7	3/4-mile	same	same
Runway 25	1 mile	same	same
Runway 3L/21R	—	—	<1/2-mile
Approach Lighting System			
Runway 3 and 21 (3R and 21L Ultimate)	ALSF2	same	same
Runway 7	none	none	~~MALSR[2]~~none[2]
Runway 25	none	none	none[2]
Runway 3L/21R	—	—	MALSR
Passenger Terminal Facilities			
Terminal Building, Apron and Landside Access	Maintain Exist. Facilities	same	Relocate/Reconstruct[4]
Aviation Development Areas			
South MRO[3] Areas	Yes	Expand/Infill Exist.	same
South Manufacturing Area	—	Yes[5]	Expand/Infill Site
West Manufacturing Area	—	—	Yes[5]
East Cargo Areas	Yes	Expand/Infill Exist.	same
US Customs and Federal Inspection Services (FIS)	Yes	Expand Exist. Site	same
Support Facilities			
ATCT	Yes	Same	Relocate/Reconstruct[5,6]
Fuel Storage	Yes, with Expansion	Expand Existing Site	Expand/Reconstruct
ARFF	Yes[7]	Maintain[7]	Maintain
Notes			

1. Source: Mead & Hunt, Inc. projections.
2. A determination on the "ultimate" closure of the Runway 7/25 will be made in conjunction with the construction of Runway 3L/21R.
3. Maintenance, Repair, & Overhaul facilities.
4. See Chapter 4 for details on new passenger terminal development alternatives and selection of recommended plan.
5. Placeholder Development Site is identified.
6. Ultimate relocation will be coordinated after ultimate Airport expansion of terminal and 3rd runway.
7. New ARFF Facility is currently under construction.

Future Improvements

1. Taxiway Improvements - Near-Term and Future
2. Airport Rescue and Fire Fighting Facility
3. Maintenance, Repair and Overhaul Expansion
4. East Area Cargo Expansion
5. North Area Expansion (Cargo & Maintenance Center)
6. Fuel Facility Upgrades/Expansion
7. West Area Manufacturing Reserve
8. U.S. Customs Service Capacity Upgrades
9. Corporate/General Aviation Expansion
10. Existing Corrections Facility Relocation
11. Maintenance, Repair and Overhaul Ramp Expansion
12. General Aviation Expansion (T-Hangars)
13. Deicing Facility Development

NORTH AREA

PASSENGER TERMINAL AREA

EAST AREA

SOUTH AREA

Airport Drive

Grove Road

Interstate 90

FUTURE PROPERTY ACQUISITION

Ultimate Improvements

14. Runway 3L-21R and Taxiway Construction
15. Runway 3R/21L and Parallel Taxiway Extension
16. Runway 7-25 Maintenance Assessment
17. Air Traffic Control Tower Relocation
18. Future Aviation Related Business Expansion
19. South Area Expansion with Electric Avenue Relocation

750'
0 Feet 1,500'
N

Prepared By: Mead&Hunt www.meadhunt.com

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Figure 3-21

Ultimate Airfield Vision

Spokane International Airport

CHAPTER 4

Terminal Facilities

4.0 INTRODUCTION

The passenger terminal is the public face of the Spokane International Airport (GEG or "the Airport") to the community and the front door to airport users. Visitor's first impressions of Spokane and the Inland Northwest are generated within the terminal facilities. Amenities provided to the traveling public will encourage use of the Airport, add value to the passenger experience, and improve the perception of the Airport. The passenger terminal facility is comprised of three primary structures attached in a linear fashion with a connecting corridor. The Terminal A/B terminal is located in the center structure. Terminal C is located southwest of Terminal A/B and the consolidated Rent-A-Car (RAC) facility is located in the Ground Transportation Facility (GTF) north of Terminal A/B. Terminal A/B was completed in the 1960s, Terminal C was added in 1999, the GTF was built in 1995, and the rental car Quick Turnaround Facility (QTA) was added in 2009. Passenger terminal layout is presented in Chapter 1.

The terminal is divided into *sterile* and *public* areas. Sterile areas are located past the Transportation Security Administration (TSA) checkpoints, and are only accessible to ticketed passengers and authorized personnel. Public areas are accessible to everyone, and located before the TSA checkpoints.

The sterile area is separated into two branches that do not connect: Terminal A/B and Terminal C. Terminal A/B has 80,000 square feet (SF) of sterile area that includes Concourse A, Concourse B and a concessions area called the "Rotunda." Terminal C has 22,000 SF of sterile area at the upper gate level and 12,000 SF at the lower gate level.

The purpose of this chapter is to review the characteristics and issues surrounding the Airport's existing passenger terminal facilities, and to identify development recommendations for the terminal area's long-term configuration. Major reconfiguration of the Airport's passenger terminal facilities is at least a few years down the road. A goal of this chapter is to identify property that should be reserved for passenger terminal development.

Several documents are used as guidance during the development of this chapter, including the following.

- Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5360-13A, Planning and Design Guidelines for Airport Terminal Facilities (2012).
- TSA Recommended Security Guidelines for Airport Planning, Design and Construction (TSA Guide, May 2011).
- International Air Transport Association (IATA) Airport Development Reference Manual (2004).
- Airport Cooperative Research Program (ACRP), Report 25: Airport Passenger Terminal Planning and Design Guidebook (2010).

4.1 FUNDAMENTALS OF TERMINAL DESIGN

Terminals are designed to satisfy various passenger processing functions and to provide a range of incidental service amenities that enhance the downtime experience. Local needs and preferences have a significant influence on the layout of a terminal and the amenities provided, so passenger terminals can vary significantly between airports. The terminal building facilities are also affected by changes occurring in the airline industry, such as airplane size and even pricing policies (e.g., baggage fees). For this reason, terminal buildings are modified and reconfigured more frequently than the airside facilities discussed in Chapter 3. Common factors affecting terminal design and amenities include the following:

- Airport role as an Airline Hub, with connecting flights, versus Spoke, with flights to a hub
- Volume of Passengers
- Aircraft Fleet Mix (e.g., type of aircraft)
- Level of Service (affects wait times and space per person)
- Passenger Mix (e.g., tourist versus business)
- International travel

4.1.1 GEG-Specific Considerations

In addition to the fundamentals of terminal design introduced in this section, the following items have the most influence on passenger terminal planning-related decisions.

Functional Efficiency

Terminal A/B and Terminal C operate independent of each other and have redundant systems. While independent terminal layouts are successful operationally at the largest airports across the country, they tend to be inefficient for small to medium-size airports such as GEG.

Configuration and Location

The Terminal A/B concourses cannot be extended because of runway and taxiway setback requirements. A significant amount of apron and terminal building frontage is inaccessible due to the 'Y' configuration formed by concourses A and B. After the new runway is constructed, discussed in Chapter 3, the ideal location for the terminal is at the midfield position, discussed in Section 4.4.

Building Capacity

Terminal A/B has an annualized capacity of about 1.9 million passenger enplanements (3.8 million total passengers) which is forecast to be exceeded around 2030. Long-range plans are presented in Section 4.8 to address this capacity shortfall.

Gate Capacity

Gate capacity deals with the number of loading positions available around the terminals. Gates at GEG are underutilized and can accommodate additional flights. However, there are more gates available in Terminal A/B than there is floor space to accommodate the passengers.

Building Systems

The capacity and functionality of the building systems is a concern for GEG, particularly for Terminal A/B. Increasing resources need to be allocated to repair and maintain the aging systems. The lack of information technology (IT) conduit is a key limitation for implementing new technologies. The overall cost to complete the "behind the walls" renovation will be high.

Other Improvements

Additional concessions, retail, and restrooms are desired to improve the passenger experience, both on the public and sterile sides. There is a desire to relocate the rental cars to the parking garage and to improve the airport administrative and police/security offices. Consideration is being given to a future U.S. Customs facility within the terminal building to accommodate international charter and potential future scheduled international flights.

Passenger terminal layout at GEG is presented in **Figure 4-1**.

4.2 IMPROVE FUNCTIONAL EFFICIENCY

Passenger Terminals A/B and C each have dedicated check-in and ticketing area, baggage makeup and return, security checkpoint, and concessions. Combining these functions in a central location would provide several advantages: space savings and reduction, reduced maintenance, improved redundancy and flexibility, enhanced personnel usage, and improved passenger flow. A feature fairly unique to GEG is the long corridor that connects the two terminals. Passengers making a connection must exit the sterile area, walk the corridor, and be re-screened at the next checkpoint.

Additionally, the concessionaires have access only to the security-checked passengers in one terminal which also limits the food choices for waiting passengers. The distance between the two terminals limits airport management's ability to implement common-use and other space-optimizing techniques.

The planning process explored several recently completed airport terminal projects having similar characteristics to GEG, including: Jacksonville, FL (JAX), Indianapolis, IN (IND), Dallas Love Field (DAL), and Portland, OR (PDX). The peer projects involved reconfiguring the terminal and concourses to consolidate common functions, improve passenger flow, and enhance concession access. The JAX example is shown in Figure 4-2.

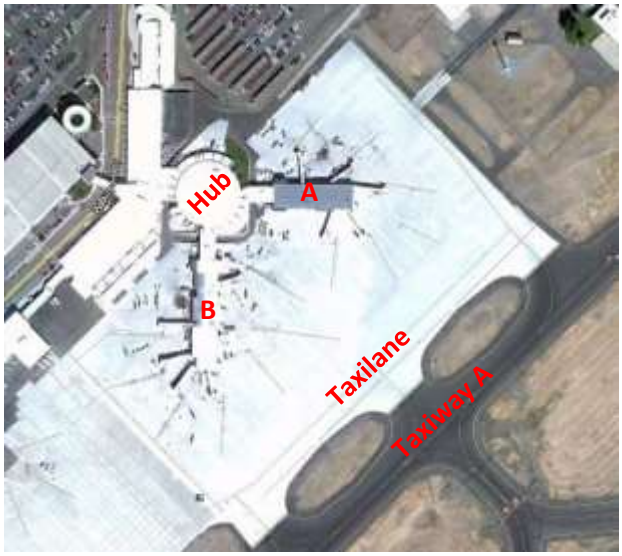
Figure 4-2

Peer Airport- JAX

4.3 CONFIGURATION AND LOCATION

Terminal A/B is physically constrained by runway and taxiway setback requirements. Because of the proximity of the terminal apron edge taxilane and the relationship to parallel Taxiway A, it is not possible to extend the Terminal A/B concourses toward Runway 3/21. The "Y" shaped configuration formed by the A and B concourses eliminates gate positions adjacent to the hub section of the terminal, and does not efficiently use space in between the two concourses.

As discussed in **Chapter 3**, the ultimate vision for the Airport includes the construction of a new runway parallel to existing Runway 3/21 on the west side of the airfield. Construction of this runway will likely occur as a capacity enhancement beyond the 20-year planning horizon. The existing terminal location favors operations on existing Runway 3/21 only. **Figure 4-3** shows the ideal mid-field terminal location; however, it is recognized that the mid-field location is a long-term recommendation. For the near-term and mid-term, the terminal will continue to operate in its existing location. Ultimately, the construction of the future runway combined with a midfield terminal complex will establish an unconstrained operating environment at GEG.



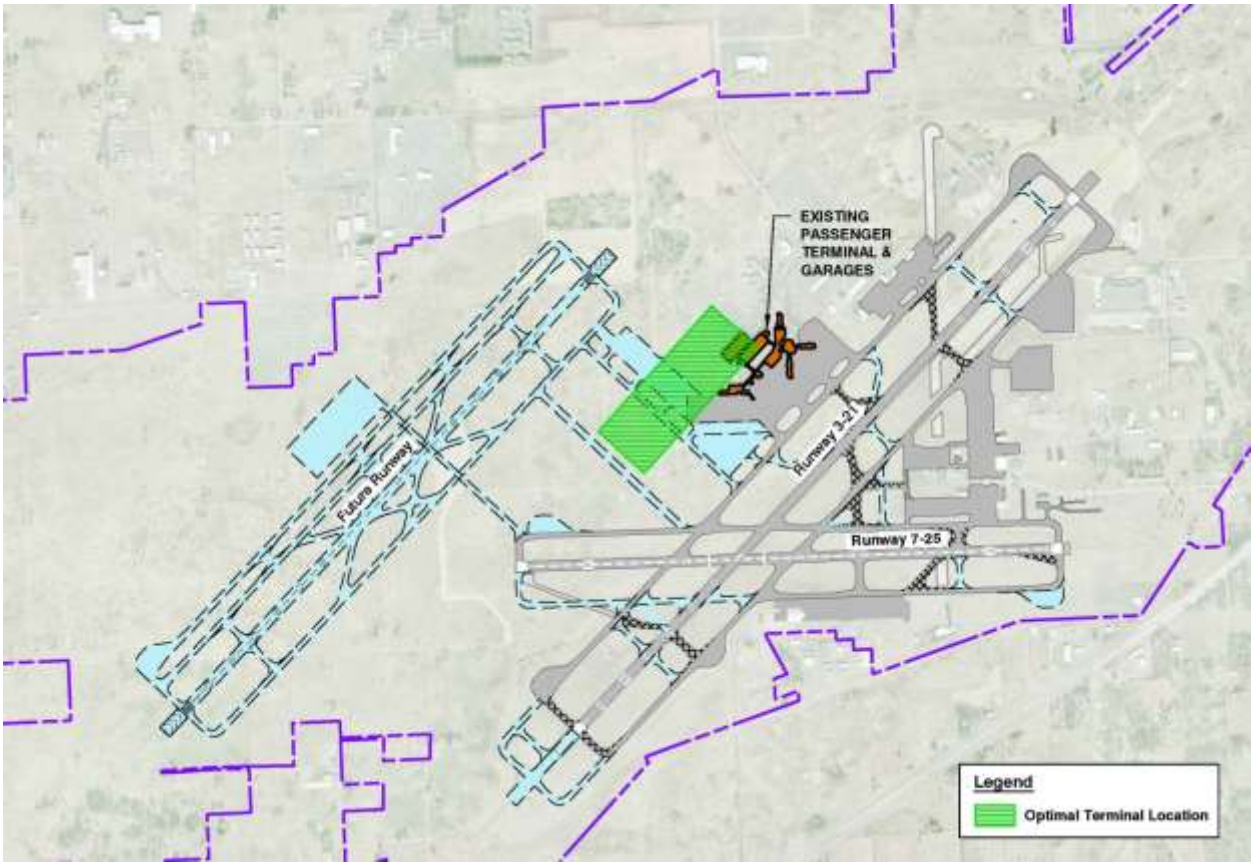


Figure 4-3

Optimal Ultimate Terminal Location

4.4 TERMINAL BUILDING CAPACITY

A terminal's primary functions are to process passengers, and provide services and amenities. These functions require floor space. The capacity of the building space is generally assessed in terms of a design peak hour, which is often annualized for comparison with annual traffic demand. Capabilities of Terminals A/B and C are assessed individually because the terminals operate independently. The following information and assumptions were used to derive conclusions presented in this chapter.

- Terminal A/B and Terminal C passengers account for the accommodation of 61.7% and 38.3% of total GEG passengers, respectively. The share will remain constant and can be applied to the peak hour enplanements contained in Table 2-33.
- 80% of peak hour enplanements are in the gate area more than 15 minutes prior to flight.
- 80% of holdroom passengers are seated. The remaining 20% are standing.
- Each seated passenger requires 17 SF and each standing passenger requires 12 SF.

4.4.1 Terminal A/B Capacity Planning

Terminal A/B has a sufficient number of gates to accommodate projected passenger demand; however, the internal configuration of the concourses creates congestion and crowding around the gates in use. Terminal A/B capacity planning uses the industry standard metric of 2,400 square feet per gate in use to determine space requirements. This metric includes waiting area for enplaning passengers, circulation area for deplaning passengers and passengers passing by through the holdroom, and area for airline employees. Expected gate demand in Terminal A/B is derived from total gate demand presented in **Section 4.8.3**. Terminal A/B hold room demand is presented in **Table 4-1**.

Table 4-1. Terminal A/B Hold Room Demand

	2010	2015	2020	2025	2030
A/B Enplanements	982,313	1,222,998	1,343,691	1,608,087	1,924,907
A/B Peak Hr. Enplanements	458	508	605	723	866
A/B Gates in Use	8	9	11	13	15
A/B Space Required (SF)	19,200	21,600	26,400	31,200	36,000
Existing Holdroom (SF)	11,000	11,000	11,000	11,000	11,000
Difference (SF)	-8,200	-10,600	-15,400	-20,200	-25,000

Using the 2,400 square feet per gate in use metric, it is apparent that the Airport needs to add additional holdroom space to accommodate existing and projected demand. A more detailed terminal area plan, to be completed as a separate project, is recommended. This plan will evaluate the floor plan of existing Terminal A/B and identify areas for expansion and renovation to provide more holdroom area per gate. It is recommended that the Airport add additional holdroom space to Terminal A/B to accommodate passengers during construction and renovation.

4.4.2 Terminal C Capacity Planning

Terminal C accommodates ground boarding on the lower level and gate boarding on the upper level. The ground level boarding area can feel crowded during peak periods. It is expected that Alaska Airlines will continue to use the ground boarding area in the foreseeable future, and that this hold area will require expansion as passenger volumes and flight frequencies increase. Expected gate demand in Terminal C is derived from total gate demand presented in **Section 4.8.3**. Terminal C hold room demand is presented in **Table 4-2**.

Table 4-2. Terminal C Hold Room Area Needs					
	2010	2015	2020	2025	2030
C Enplanements	609,813	697,150	834,155	998,220	1,194,969
C Peak Hr. Enplanements	276	315	377	451	540
C LL Gates in Use	3	3	4	5	6
C UL Gates in Use	2	2	3	3	4
C Space Required (LL) (SF)	7,200	7,200	9,600	12,000	14,400
C Space Required (UL) (SF)	4,800	4,800	7,200	7,200	9,600
Existing Holdroom (LL) (SF)	3,550	3,550	3,550	3,550	3,550
Existing Holdroom (UL) (SF)	7,000	7,000	7,000	7,000	7,000
Difference (LL) (SF)	-3,650	-3,650	-6,050	-8,450	-10,850
Difference (UL) (SF)	2,200	2,200	-200	-200	-2,600

LL – Lower Level, UL – Upper Level

Terminal C capacity planning suggests that the Airport should look to expand the lower level holdroom to accommodate existing and projected passenger enplanements within the next ten years. The upper level hold room has sufficient space to accommodate near-term demand, but may require expansion towards the end of the planning period. Demand for ground boarding versus gate boarding is dependent on airline fleet mix. Alaska Airlines is the principal airline in Terminal C, and should they change aircraft type, there may be increased demand placed on the upper level of Terminal C, accelerating the need for upper level holdroom expansion. Gate demand presented expects that Alaska Airlines will continue to operate a mix of Boeing 737 and Bombardier Q400 aircraft, and that Frontier Airlines will continue to operate Airbus A318 or similar aircraft.

4.5 GATE CAPACITY

Gate capacity deals with the number of loading positions available around the terminals. Gates at GEG are underutilized, and can accommodate additional flights. However, there are more gates available in Terminal A/B than there is floor space to accommodate the passengers. Routinely, passengers spill into adjacent gate areas while waiting for their flight. Significant crowding within Terminal A/B is expected to occur upon full gate utilization.

Terminal C gates include three upper level loading bridges and four ground loading positions. Due to the shorter turn times, sometimes a quick as 30 minutes, ground loaded gates servicing smaller aircraft have a higher capacity than loading bridges.

4.6 BUILDING SYSTEMS

The capacity and functionality of the building systems is a concern for GEG, particularly in Terminal A/B. Increasing resources need to be allocated to repair and maintain the aging systems. It is difficult and costly to upgrade existing systems because of the design of the building. The heating, ventilation and air conditioning (HVAC) systems are located in a basement and require regular maintenance. In their existing location they cannot be overhauled and replaced; a separate housing would need to be constructed for the HVAC system. There is also limited conduit space throughout the building to run new wire for upgrading telecommunications and implementing new flight information and gate management technologies. Some building systems upgrades could also trigger upgrades to meet building code, further increasing the costs. The consensus is that Terminal A/B could be near the end of its economic life without significant expenditures related to building systems. This will require the use of technology to leverage the existing infrastructure; passive upgrades such as a "white roof" to make the building more sustainable with existing systems and relocation and centralization of obsolete systems to open up space for expansion are all necessary strategies to extend the life of existing Terminal A/B.

4.6.1 Mechanical/Electrical Systems and Utilities

Buildings require mechanical and electrical systems to maintain interior environmental conditions necessary for the comfort and safety of occupants. These systems include water, sewage, gas, ventilation, electric, and IT.

Airport maintenance staff describe the building systems, particularly in Terminal A/B, as being in poor condition, significantly over-taxed, and operating beyond their useful life. Specific deficiencies include the following.

- No IT backbone – no space available to route conduits and cable.
- Lacking communication and equipment rooms – spill over into other space is occurring.
- Fifty year-old systems in Terminal A/B basement cannot be replaced in their existing location.
- The newer systems of Terminal C are incompatible with those of Terminals A/B. There is no mechanical duct connecting the two terminals. Terminal C uses a 4-pipe mechanical system and Terminal A/B uses a 2-pipe mechanical system.
- Operating costs are high and increasing as a result of increased maintenance and inefficient energy usage.
- Newer, more efficient systems cannot be easily incorporated into the existing systems.
- Minor changes to a system could trigger more comprehensive and costly building code upgrades.

The ability of the existing systems to accommodate the needs of the facility is questionable. A detailed systems inventory and analysis is necessary to identify the most cost effective strategy for upgrading and modernizing the terminal. Demolition and reconstruction may be the best solution.

4.6.2 Terminal Wayfinding

Wayfinding refers to a system that aids the user in determining a path toward a desired destination. A wayfinding program includes an evaluation of signage and other direction given to people along paths inside the terminal building. In addition to printed signs, building design and form also provide directional clues. A comprehensive wayfinding program will improve public safety as well as the overall passenger experience. Ideally, the perfect wayfinding scenario is one where airport users are able to navigate intuitively and without the reliance on signage. Building design that factors in the user experience with informed views from various decision points is preferred.

Comments expressed at user meetings in 2011 indicate that airport users often find wayfinding difficult. Although wayfinding at GEG is not evaluated in depth in this text, two problem areas were identified during the user meetings. The first was the public corridor connecting Terminal A/B with Terminal C, and the second was the connection to the parking garages. The connecting corridor between Terminal A/B and Terminal C is long and narrow with a low ceiling. It winds such that the pedestrian can only see a portion of the corridor at a time, making it feel like it is not a public space. Potential improvements include: centralization and expansion of this location; interior aesthetic improvements such as art; pedestrian signage enhancements; and technology enhancements such as smart phone maps, radio-frequency identification (RFID) tags, increased help staff and kiosks, larger flight information screens, or map functionality incorporated into ticketing kiosks.

4.6.3 Technology

Technology is adopted to optimize the functioning of airport terminals. Goals include making the facility more cost effective, more efficient for travelers and staff and more sustainable. The following examples discuss the impacts of new technologies:

- **Electronic Ticketing**: Increased use of electronic tickets and ticket machines is likely to continue reducing demand for ticket agents, and relieving congestion at associated queuing areas. This is likely to affect the overall form of airports, since there will be no need for large ticketing halls. In the near future, expansive space formerly associated with ticket lobbies may be shifted to the bag claim or checkpoint areas where people now spend more time. Reduced need for ticketing would change traditional layout of airports, and passengers could be dropped off in a location that gave direct access to the checkpoint.
- **Self-Bag Check**: A self-bag check allows passengers who arrive at the airport with tickets to check baggage without standing in line at ticket counters. This reduces queuing congestion at the ticket lobby. A self-bag check would need to be staffed, and may function in a similar manner to curbside bag check in, except that it occurs inside the airport terminal instead of outside. A passenger self-bag check is best located in an area adjacent to the checkpoint.
- **Remote Bag Check**: Allows passengers to check bags at off-airport locations such as parking garage, hotels, convention centers and car rental facilities. These bags are delivered to the airport, where they are merged into the airport baggage system. An airport employing remote bag check would require a location for vehicles carrying these bags to bring them to the airport,

where they must be screened by TSA before they are merged into the rest of the airport bag system.

- **Common Use Facilities**: Many existing airline facilities, such as gates, holdrooms, and ticket counters are utilized exclusively by a single airline. These facilities are generally not used continuously throughout the day. Common use technology enables an airport operator to make these spaces and resources available for use by multiple airlines at different scheduled times. This allows a more efficient use of facilities and increases the capacity of the airport without necessarily increasing the amount of gates, hold rooms, Terminals, ticket counters or terminal space.

  Disadvantages for airlines relating to common use facilities include: less autonomy and more reliance on non-airline staff, less opportunity for branding, a need to train airline staff to use the facilities. Airline advantages include: cost savings relating to renting facilities only when needed, and flexibility of facilities for new service and emergencies.

  ACRP Synthesis 8, *Common Use Facilities and Equipment at Airports*, describes the following facilities, which have the potential to be common use systems:

  - CUPPS (Common Use Passenger Processing System): This is a fully integrated common use system, for use with check in kiosks, ticket counters, gates, boarding controls and information displays.
  - CUSS (Common Use Self Service): An industry standard, airport provided, check-in kiosk system that allows passengers access to multiple airlines, while preserving airline brand identity.
  - Gate Management System: A system that guides an aircraft to a gate, reports actual aircraft arrival and departure times, tracks gate utilization, and provides billing accordingly. This system reduces the need for aircraft marshallers, and reduces congestion on the apron and at gates.
  - Advanced Flight Information Display System, (FIDS): Advanced display techniques allow use of airline logos. FIDS can list real time information pertaining to the flight: arrival and departure time, gate number, bag claim number, and remarks pertaining to the flight, such as delays or gate changes. The FIDS allows for different information to be displayed in different locations, and can be integrated into a wayfinding and common use gate management project. It does not require a layout change to the Airport, but would involve a significant information technology systems upgrade. Locations for displays include: ticket lobby, in secure corridor directly after checkpoint, waiting areas, and online access. This system can integrate visual paging and advertising programs
  - Common use may include any facility that is used by passengers or that services aircraft: bag claim devices, parking facilities, building physical plant, use of preconditioned air and ground power at gates.

- **Radio Frequency Identification (RFID)**: This in-line baggage tag tracking system involves use of a baggage tag with both printed information and an imbedded RFID chip. The chip is read and routed by the baggage system. This technology is being implemented at airports, including Las Vegas, Los Angeles, and Denver, as well as for cargo shipping facilities including Wal-Mart and the U.S. Department of Defense.

It is important that GEG continue to implement technology that supports a transition to all common-use facilities. Transitioning to CUSS/CUPS and integrating the public address system reduces the number of systems to be monitored. Likewise, gate management systems can create flexibility in monitoring the airport in addition to maximizing usage. These efficiencies help defray the acquisition costs by reducing staff time spent on facilities.

A major road block to implementing CUSS/CUPS at GEG is the absence of IT infrastructure and the need to identify space to accommodate it. Significant improvements are needed in the building systems behind the walls, which will be difficult and costly to achieve through renovation.

4.6.4 Sustainability

At a national level, the FAA's VALE (Voluntary Airport Low Emissions) program provides airport improvement program (AIP) funding and expedites the environmental review process for qualified projects that will result in a reduction of aircraft emissions or energy demand. In the past these programs have been voluntary, but it is increasingly common that these programs are required by federal, state, and local regulations.

Significant improvements to energy usage and cost reductions will be achieved by modernizing terminal building heating, ventilation, and air conditioning (HVAC), electrical, lighting, and plumbing systems. The renovations or reconstruction efforts should apply sustainable principles wherever possible; such as the active and passive solar systems.

Due to technological advances, sizable opportunities exist for improving efficiency and operating cost in a building by replacing inefficient terminal building systems with efficient ones. Other opportunities for improving energy efficiency include replacement of existing conventional systems with renewable systems.

A building's demand for energy can be greatly affected by solar orientation. Solar technologies are divided into active and passive systems. Active systems absorb and convert the sun's energy into usable light, heat, ventilation or electricity, augmenting a building's utility systems. Passive systems allow solar energy to enter a building in the forms of light, heat, or ventilation and contribute directly to the comfort of the building users, resulting in a reduction of a building's energy demand. For a building using passive solar design, the optimal shape is to be long in the east-west direction and to allow the south side of the building to take advantage of optimal sun exposure in the winter months.

The information in this section identifies some sustainability opportunities related to the terminal building improvement program; however, it should also be recognized that airport management continues to

focus on the use of best practices to encourage sustainability in all areas related to the operation and improvement of the Airport.

4.6.5 Level of Service (LOS) Expectations

Terminal planning and design involves balancing a variety of goals, including enhancing safety, security, convenience, efficiency, and aesthetics. Improvement recommendations must provide a cost-effective means of providing passengers and the public with a comfortable and pleasant travel experience. LOS is widely used by traffic engineers to grade the efficiency of transportation infrastructure. For passenger terminals, LOS measures space requirements and passenger comfort in terms of wait times and space per person. LOS does not consider operational and economic goals.

IATA defines LOS at airports from A-F, presented in **Table 4-3**. LOS C or higher is a standard design goal.

Table 4-3: IATA SERVICE LEVELS	
LOS A	Excellent level of service; condition of free flow; no delays; excellent level of comfort
LOS B	High level of service; condition of stable flow; very few delays; high level of comfort
LOS C	Good level of service; condition of stable flow; acceptable delays; good level of comfort
LOS D	Adequate level of service; condition of unstable flow; acceptable delays for short period of time; adequate level of comfort
LOS E	Inadequate level of service; condition of unstable flows; unacceptable delays; inadequate level of comfort
LOS F	Unacceptable level of service; condition of cross-flows, system breakdown and unacceptable delays; unacceptable level of comfort

Source: IATA Airport Development Manual (2004)

ACRP Report 25, *Airport Passenger Terminal Planning and Design* says:

> "… LOS C is typically recommended as a design objective for the design hour because it denotes good service at a reasonable cost, with LOS A having no upper boundary. From a practical terminal planning perspective, the challenges are to determine the occupancy of reservoirs during the peaks and establish acceptable waiting times for processors."

A fundamental issue with adopting LOS specifications is that the perception of stakeholders may differ on the designation of the LOS standard that should be provided or on the metrics used to define LOS. Though it may be reasonable to expect convergence of opinion on qualitative definitions of LOS, the translation of these qualitative definitions into metrics is likely to result in a divergence of opinion.

For example, a planning objective expressed as a standard to provide LOS C, which might be described qualitatively as passengers experiencing acceptable delays and a reasonable level of comfort could be expected to engender widespread support. However, when a target quantitative space standard, queue length, and wait time is associated with this standard, it is likely to generate disagreement among the stakeholders.

GEG has established a goal to limit average peak waiting time to 10 minutes.

At GEG, LOS C represents average peak period times remaining at or below 10 minutes. The functional areas to be specifically assessed include: check-in, security check-point, restrooms, and bag claim.

4.6.6 Other Improvements

Listed in this section are additional improvements specific to the existing facilities that were identified through in collaboration with airport management and staff, along with on-site TSA personnel.

Security Screening Checkpoints (SSCP)

The security process and function is a key component of passenger experience and functional efficiency of terminal building design. GEG has two SSCPs, one for Terminal A/B and one for Terminal C. Each SSCP serves as the entrance point to that sterile area. The wait time at the GEG checkpoint areas can be as high as 22 minutes. The TSA Guide notes, however, that the maximum waiting time tolerable is two to eight minutes.

- **A/B Checkpoint**: The SSCP at Terminal A/B is elevated approximately five feet above the ticketing and baggage areas to correspond with the floor elevation of the rotunda. Because of the elevation difference, overflow queuing occurs on the ramp leading to the SSCP and into the public circulation area. The A/B SSCP does not allow sufficient space for divided queuing into three lanes. The elevated floor creates a low ceiling at the SSCP, which makes the space feel smaller than it is. TSA reports that lighting in this area is insufficient.
- **C Checkpoint:** The queuing and checkpoint areas at Terminal C function adequately. However, the post SSCP re-composure area encroaches on access to elevators and escalators. In addition, the only family restroom on the secure side is located behind the agent podium at the exit lane. This location is not desirable because it appears to passengers that they will be exiting the checkpoint in order to gain access to the restroom. Opportunity exists to reconfigure the SSCP using excess space available in the ticketing lobby.

Sterile Terminal Connection

Although it is not a common occurrence, passengers making a connecting flight between the two sterile areas must exit and re-enter and re-process through the other SSCP. In addition to being inefficient, it is inconvenient and sometimes frustrating for passengers. The addition of a sterile connection between the two areas would improve efficiency and passenger convenience. The need for the connection will increase due to expanded code-sharing between airlines and potential airline mergers. Although not an ideal use of airline or airport resources, a non-construction option is to run an airside connection shuttle similar to those in place at Los Angeles International Airport (LAX).

If a secure connection shuttle were to be moved forward as an operational consideration, it would be need to be programmed in a manner acceptable to TSA.

Concessions

A common theme that appeared during terminal stakeholder meetings was the need to expand concessions services, primarily restaurants, in both the public and sterile areas. The demand has increased due to the increased dwell times passengers are spending at the Airport. Concessions provide

passengers with goods and a diversion while they wait, and provide the Airport with a source of revenue. Passenger concern focuses primarily on increasing availability. Feedback from concessionaires identified three issues: the desire for a terminal loading dock, a sterile connection between A/B and C, and improved lighting inside the rotunda.

Baggage Screening and Makeup

Baggage screening is conducted by TSA. At Terminal A/B, bags are screened using X-ray equipment in a centralized remote 4,600 SF room. There is 50 feet of depth behind the ATO for baggage makeup. GSE storage is stored in the baggage makeup area overnight. In Terminal C, TSA facilities are located between the Airline Ticket Offices (ATOs), and the outbound baggage makeup area. Ground service equipment (GSE) is stored in the baggage makeup area overnight. It is recommended that a separate GSE facility be provided.

Airlines at GEG have indicated that the screening system does not allow bags to be rerouted when a component is not operational. It is recommended that future baggage screening systems incorporate bypass functionality.

Baggage Screening and Makeup

There are two locations for bag claim at GEG: one location in Terminal A/B and another in Terminal C. Both of these locations have baggage service offices to assist passengers.

In Terminal A/B, there are three claim devices: one U-shaped flat plate device (175 LF); one circular sloped plate device (60 LF); and one oval sloped plate device (98 LF). Because of their small size, the sloped plate devices are sufficient for small and medium aircraft but may be unable to accommodate baggage volume associated with larger aircraft. There is 8,000 SF of associated waiting area, which is congested at peak times and has insufficient seating. The Terminal A/B area does not have sufficient depth around the claim devices. AC 150/5360-13 recommends that medium-hub airports provide 20-30 feet of depth for public circulation at the bag claim device.

Terminal C has two T-shaped flat plate devices (110 LF each). These devices are sufficient to serve large aircraft. There is 4,500 SF of associated waiting area, which is congested at peak times, and has insufficient seating.

Passenger Restrooms

Local building codes establish the minimum amount of restroom space. Washington uses the International Building Code, or IBC. To account for deplaning passenger volumes in sterile areas, the number of water closets provided at an airport is typically double or triple to the IBC recommendations. The location of restroom facilities should be considered in addition to quantity. An equivalent aircraft, or EQA, is a narrow body jet with 145 seats. ACRP Report 25 advises providing a restroom for every 8 EQA-gates in order to provide reasonable walking distances. Any reallocation of terminal space should consider either an additional restroom or relocation away from the SSCP.

The current number of fixtures provided on the non-secure side is insufficient, indicated in **Table 4-4**. The insufficient restroom capacity is further exacerbated by the fragmented layout of the terminal and the

absence of wayfinding measures. An additional public area restroom is recommended. Structurally, the easiest area to build an additional restroom would be in the connection between Terminals A/B and C, however this location would be inconvenient for most passengers. For this reason, an expansion of the central restroom should also be considered. All new restrooms should incorporate family restrooms and wayfinding support.

Table 4-4: Public Toilet Fixture Requirements

Year	Peak Hour Passengers	Water Closets: Male Non Secure Area			Water Closets: Female Non Secure Areas		
		Code - IBC	Existing	Recommended	Code - IBC	Existing	Recommended
2009	1,348	11	17	23	11	17	23
2015	1,618	11		23	15		31
2020	1,826	14		29	16		33
2025	2,066	15		31	18		37
2030	2,324	16		33	19		40

IBC – International Building Code (incorporated into Washington code).

Car Rental Counters and Queuing

The car rental facility is located at the north end of Terminal A/B, and was built in 1995. There are seven providers: Hertz, Enterprise, Dollar, Vanguard (National and Alamo), Avis, Thrifty, and Budget. The rental counter measures 133 linear feet. The queuing area is approximately 1,300 Square Feet (SF) with a depth of 10 feet. AC 150/5360-13 recommends providing 350-400 SF of rental car area per million annual enplanements. The existing rental area is 1,125 SF including counters and office area. As shown in **Table 4-5**, this area is sufficient for the 2030 planning period, and the queuing area is also adequate.

Table 4-5: Rental Area Requirements

Year	Annual Enplanements	Existing Rental Area	350 SF/ Million	400 SF/ Million
2010	1,592,126	1,125	535	611
2015	1,813,749		635	725
2020	2,060,340		721	824
2025	2,330,925		816	932
2030	2,622,356		918	1049

Because of the linear design of the terminal building, the location of the rental car area is convenient to passengers using Terminal A/B, but too great a distance from Terminal C. Improvements may be achieved by relocating the counters and pick-up to a central location within the terminal or parking garage.

Vendor Loading Area

Equipment and supplies for terminal tenants are currently delivered to an off-site loading facility or by parking in designated vendor parking areas located at each concourse. Each individual tenant must travel

to the loading dock, receive the goods, and bring them back to the terminal for distribution. A loading dock adjacent the terminal would improve the transfer.

Airport Police Facilities

The airport police station is located in the corridor connecting Terminals A/B with C. The location is not appropriate and the space is inadequate with copy machines and filing boxes occupying the hallways. Police facilities also require significant information technology (IT) equipment necessary for communications, command and control. The existing location is only suitable for certain functions such as badging and paging.

The following improvements are recommended to the police station facilities.

- Relocation and expansion at a central location having limited exterior wall exposure.
- A dedicated communication and dispatch center having adequate IT and communication capacity.
- Administrative space for copying and filing.
- Hold rooms and interview rooms.

Airport Administration and Support Areas

The Airport Administration Area is located above the ticketing facilities in the A/B terminal. It includes 6,200 SF of office space, and meeting rooms. No additional staff can be accommodated in the existing location as the available area is at capacity. The linear configuration of the space excludes common areas that support communication and teamwork. Improvements should include a floor area increase of 50% - 100% to satisfy current and future staffing requirements, and facilitate reconfiguration of the office space into a layout that fosters teamwork and communication. Additional space is needed for event coordination and meetings.

International Gates

This section considers space needs for both international passenger and cargo services. International arrivals require a dedicated area in the terminal for passenger processing called a U.S. Customs and Border Protection Airport Passenger Processing Facility (CBP Facility). International cargo requires a Federal Inspection Station (FIS), which would also screen baggage on international passenger flights.

A CBP Facility includes aircraft arrival gate vestibules, a sterile corridor system, international baggage claim, passenger processing areas, and office and support areas. The size of the CBP facility is determined by the number of passengers processed at the peak hour of operation, and by the number of aircraft arrivals. Typical square footage for a CBP Facility/FIS for the arrival of a 757 aircraft is shown in **Table 4-6**. Additional aircraft arriving simultaneously would primarily impact bag claim, passenger arrival, and secondary screening.

The 18,095 SF calculated in **Table 4-6** reflects the space required in the terminal to accommodate regular international passenger service.

CBP procedures and FIS processing are currently handled at a separate facility on the east side of the Airport. The facility and staffing is sufficient for flights with fewer than 30 passengers. It is recommended

that this facility be expanded to accommodate 60 passengers or more, and that future passenger terminal developments consider explore moving CBP Facilities and FIS into the terminal.

4.7 TERMINAL ALTERNATIVES

The preceding sections of this chapter assessed the adequacy of the existing facilities and identified improvement needs. That evaluation process forms the foundation from which terminal alternatives were developed.

Table 4-6: Typical CPB/FIX Requirements for a 757	
Deplane Area	**SF**
Baggage	
Baggage Inbound	1,200
International Bag claim	2,000
Passengers	
Sterile Corridor System	2,400
Four Primary Booths and Queuing	5,300
CPB Coordination	225
Counter Terror	475
Public Toilet	300
Subtotal	**11,900**
Secondary Space	
Exit Podium/Control	185
Secondary Queuing	250
Triage Podium	180
Secondary Bag Exam Podium & Bag Belts	760
Subtotal	**1,375**
Associated Secondary Space	
Supervisors Office	150
M/W Toilet	300
Detainee Bag Storage	50
Holdroom (Male, Female, Juvenile)	345
Cashier	50
Referral PAX Waiting	125
Secondary Bag X-Ray	1,500
AG Lab	150
Search Room	80
Interview Room	80
ADIT Room	110
Exit Podium	180
Subtotal	**3,120**
Support Space	
Chief Officer Office	175
General Office Work Stations	280
Supervisors Office	150
Mail/Copier/Shredder	70
General Storage	150
Computer Room	80
Break Room	275
Communications Room	60
Staff Toilets/Lockers	460
Subtotal	**1,700**
Public Reception	**420**
Total	**18,095**

Four options presented that replace Terminal A/B facilities with replacement timing being the primary difference between them. Terminal A/B replacement options provide a secure connection between all gates, improve the failing infrastructure of Terminal A/B; provide a unified terminal plan that responds to post 9/11 security procedures; provide for future growth and allows for future terminal innovations. As the location and layout of the terminal is primarily a response to airside activities, the options consider the location and function of the planned second parallel runway.

A fifth terminal development option was developed by an independent review. This option retains Terminal A/B until capacity warrants the construction and relocation to a future midfield terminal. In the meantime, phased improvements would be made to the existing facilities, including: consolidating bag claim within the infill area that is currently the connecting corridor between Terminals A/B and C, expanding the security checkpoints at both terminals, and adding additional concession space in sterile and public areas. The concept also includes the potential to accommodate international passengers through a convertible customs processing area and bag claim and multi-level construction above the consolidated bag claim area for expanded administrative offices and other functions.

4.7.1 Terminal Area Development Considerations

The passenger terminal building acts as the interface between landside and airside activities. Terminal planning takes into account these adjacency relationships and external influences that impact passengers, the airport, and the airlines.

Future Runway

The proposed future runway will be located on the Airport's west side. When the runway is constructed it will alter the flow of aircraft movement to and from the terminal. As activity increases over time, terminal improvements must address the upcoming change in ground traffic flow.

Control Tower Line of Sight

The existing airport traffic control tower is located south of the terminal on the opposite side of Runways 3/21 and 7/25. Future additions to the terminal need to maintain required site lines for ground control from the tower. It is recognized that the tower may ultimately relocate to a position between the existing and future parallel runways; however, that relocation would only take place after the construction of the new parallel runway which is not expected during the 20-year forecast demand planning horizon, and is not expected to occur within the exiting ATCT's life cycle.

Future Location and Function of Parking Garages

Parking garages need to be positioned as close as possible to the main access points of the terminal. The TSA has suspended enforcing a 300-foot separation rule for parking structures adjacent to terminal facilities. It is recommended that future terminal developments conduct a blast analysis, and implement blast resistant glazing. As the future terminal alternates are considered, the relationship between existing and future parking garages and the new center of the terminal needs to be considered for passenger convenience. An emerging trend in air travel is to locate check-in and baggage check locations outside of

the main terminal. This is often done within parking garages or rental car facilities, with the baggage being delivered to the centralized security screening.

4.7.2 Typical Terminal Configurations

Planning for a new or reconfigured terminal begins with a broad review and selection of a configuration and type. As noted in the previous section, the terminal is the gateway between landside and airside operations and its layout should enhance this relationship.

The selection of a preferred terminal layout is based on a variety of factors including available land, ramp area, aircraft types, passenger connection profiles, initial costs, and terminal operations. The three most common terminal configurations are: linear, finger-pier, and satellite. These may be combined into additional hybrid options. All of these layouts include a central terminal hall housing the main arrival area, ticketing, security checkpoints, baggage, and concession cores. It is the relationship between the central hall and the gates that has the greatest overall impact on the terminal's efficiency and operation.

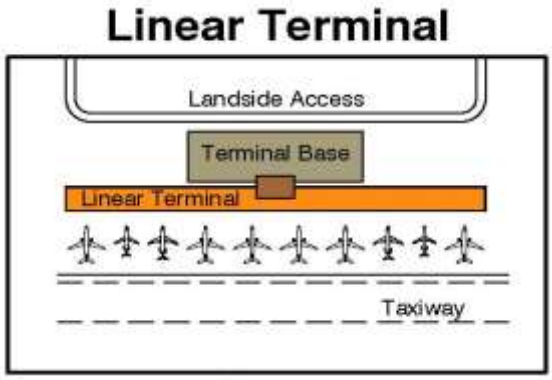


Figure 4-4

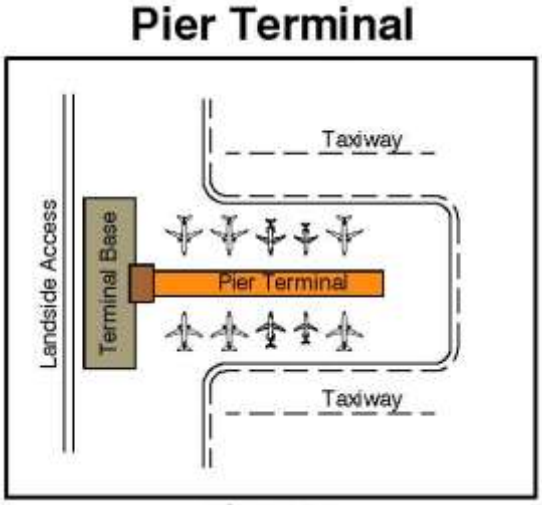


Figure 4-5

Linear terminals (**Figure 4-4**) are laid out along a single axis having gates on one side and ground transportation on the other. This design was originally used to allow people to proceed directly between the gate and their ground transportation. This "gate arrival" concept is most common at small airports having minimal airline service. Linear terminals are not conducive to common retail areas because passenger traffic is not concentrated in a single location.

The finger-pier concept (**Figure 4-5**) has course-piers extending outward from the terminal base. Aircraft are arranged around the axis of each pier. The Terminal itself provides the circulation space for enplaning and deplaning passengers. Walking distances are often less than a long linear layout, particularly for connecting passengers. Finger-pier layouts offer good potential for retail and concession. In some cases, aircraft access to the inside corners can be difficult. The spacing between finger-piers is an important factor; taxilanes between piers can be delayed by gate push-backs, and narrow taxilane throats can also restrict access to larger airplanes.

Satellite terminals (**Figure 4-6**) are physically separate from the terminal base. They are often isolated structures that are accessed by a surface, underground, or above-grade connector. Mechanical or rail systems may be employed to carry passengers and baggage between the satellite and base facilities. These terminals are often located between parallel runways. They have the advantage of not being constrained by landside considerations. Additionally, their compact nature and full airside access make them efficient with reduced walking times. This configuration is most commonly used by busier hub airports.

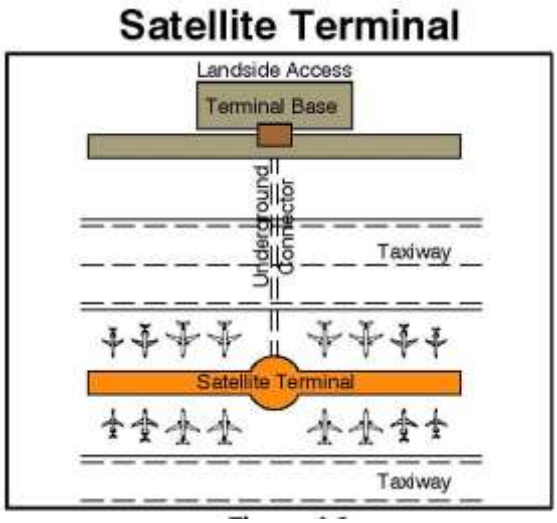


Figure 4-6

4.7.3 Projected Gate Requirements

An online survey of gate allocation in April 2011 indicated that ten passenger-boarding bridges and three ground-level doors are consistently used at GEG. To predict future gate requirements, two scenarios were analyzed. One forecasts future gates based on the Master Plan's preferred forecast, described in Chapter 2. The second projection is based on departures per gate and calculates maximum capacity based on available space and average turn times using models created for ACRP Report 25. Maximum capacity in the second projection assumes unconstrained demand and unlimited availability of aircraft and ground staff. Forecasted gate requirements generated using the number of boarding passengers per gate and scheduled departures per gate are shown in **Table 4-7** and **Table 4-8**.

Table 4-7: Boarding Passengers Per Gate

Year	Annual Boardings	Annual Departures	# Of Gates	Boardings Per Gate	Boardings Per Dep
2006	1,612,457	21,561	13	124,035	75
2007	1,739,883	24,100	13	133,837	72
2008	1,715,773	23,766	13	131,982	72
2009	1,527,955	19,517	13	117,535	78
2010	1,592,126	21,027	13	122,471	76
Forecast					
2015	1,820,148	22,732	**15**	125,972	80
2020	2,177,846	26,507	**18**	125,972	82
2025	2,606,377	30,929	**21**	125,972	84
2030	3,119,876	36,110	**25**	125,972	86

Table 4-8. Departures Per Gate					
Year	Annual Boardings	Annual Departures	# Of Gates	Annual Dep/Gate	Daily Dep/Gate
2006	1,612,457	21,561	13	1,658	4.5
2007	1,739,883	24,100	13	1,853	5.1
2008	1,715,773	23,766	13	1,828	5.0
2009	1,527,955	19,517	13	1,501	4.1
2010	1,592,126	21,027	13	1,617	4.4
Forecast					
2015	1,820,148	22,732	**16**	1,460	4.0
2020	2,177,846	26,507	**19**	1,460	4.0
2025	2,606,377	30,929	**22**	1,460	4.0
2030	3,119,876	36,110	**27**	1,387	3.8

While the results are similar, the "departures per gate" methodology is preferred because it allows GEG to maintain facilities that accommodate peak gate demand. Airline industry trends show that airlines will continue to replace smaller aircraft with larger ones which will increase the impact of peak travel times. Departures per gate anticipates that larger aircraft will increase aircraft turn times which will decrease the average number of daily departures per gate.

4.7.4 Terminal Options

Terminal Option 1: Repair Terminal A and then Expand West.

Option 1 begins by improving the conditions and layout of the existing terminal area. As improvements are made, Terminal C will act as the connection to future west expansion phases.

Option 1, Phase 1A (2015): 15 gates required

Relocating the Terminal B gates to the space between Terminals A/B and C is a key element of Option 1. Doing this creates the secure connection between all gates, provides a consolidated ticketing area and a consolidated bag claim, and creates a single SSCP. Consolidating these functions will streamline system operations, provide a system back-up, and facilitate future common use growth. Phase 1 will require two sub-phases to allow for continued operations and to preserve ticketing area capacity.

Key items include:

- Build half of the relocated Terminal B to include:
  - Three gates
  - Ground floor ticketing
  - Second level SSCP
  - Second level secure connection to Terminal C
  - Second level administration area
- Move Terminal A/B ticketing and administration area into new Terminal B

Table 4-9: Phase 1A Gate Distribution	
Terminal	Number of Gates
A	5
B	3
C	9
Total	17

- Demolish existing B gates and Terminal A/B ticketing
-

Option 1, Phase 1B (2015): 15 gates required

Key Items Include:

- Construct remainder of new Terminal B to include:
  - Two additional gates
  - Additional administration area
  - Additional concessions area
- Remove the existing Terminal A/B security checkpoint
- Add a secure connection between Terminal A and new Terminal B
- Relocate the two bag claims to the ground level of new Terminal B
- Relocate maintenance, storage, and loading functions to the old luggage area

Table 4-10: Phase 1B Gate Distribution

Terminal	Number of Gates
A	5
B	5
C	9
Total	19

Option 1, Phase 2 (2020): 18 gates required

Begins shifting the focus of the Terminal west by expanding Terminal C to the west and demolishing Terminal A. This phase will include gates and ground floor area to support the future central hub. A loading bay will be added north of the new Terminal B and tied into the new maintenance, storage, and loading areas located in the former A/B bag claim area.

Table 4-11: Phase 2 Gate Distribution

Terminal	Number of Gates
A	0
B	5
C	13
Total	18

Key Items Include:

- Add four gates to Terminal C
- Demolish Terminal A
- Add loading bay and support space

Option 1, Phase 3 (2025): 22 gates required

Options 1, Phase 3 adds an FIS facility and four new gates to Terminal A. International gates will be laid out to allow domestic flights to use the gates when they are not being used for international traffic. A new parking garage will be added to accommodate forecast passenger growth. It is assumed that the parking garage will contain a ground floor rental car facility, a parking office, and space for a second level check-in.

Key Elements Include:

- Add FIS facility and A gates

- Add new parking garage to include:
  - Additional parking near the terminal
  - New rental car facilities
  - Parking offices
  - Second level area for future check-in
- New vehicle circulation to include:
  - New approach to the terminal to prepare for expanded terminal area

Table 4-12: Phase 3 Gate Distribution

Terminal	Number of Gates
A	4
B	5
C	13
Total	22

Option 1, Phase 4 (2030): 27 gates required

Phase 4 represents the shift of the center of the Airport to a location between the two parallel runways. A new central hub will be added northwest of Terminal C containing ground floor ticketing and baggage handling with a second level security checkpoint, retail, and concessions. The check-in area located in the third parking garage will be built to accommodate a common use ticketing and baggage check. A second level pedestrian bridge will connect the second level hub to the third parking garage. A covered canopy between the two will also be built for central pick-up and drop-off. Terminal D will be added to accommodate passenger growth.

Table 4-13: Phase 4 Gate Distribution

Terminal	Number of Gates
A	4
B	5
C	13
D	6
Total	28

With the new hub located between Terminals C and D, portions of Terminal B will be converted to other airport uses: the second level security area can be converted into additional airport administration area; and the lower level ticketing can convert into an increased baggage area located closer to the central hub. A fourth parking garage may be added as needed to handle additional parking demands near the terminal. At this point the terminal is prepared to efficiently use the future third runway.

Key Elements Include:

- Add new central hub to include:
  - Ground level ticketing and concessions
  - Ground level greeter area
  - Ground level baggage handling
  - Second level security checkpoint
  - Second level concessions and retail
- Check-in area in third parking garage
- Pedestrian bridge connecting the third parking garage and the central hub
- Covered canopies for vehicle pick-up and drop-off
- B terminal renovations
- Fourth parking garage

- Add new Terminal D to include:
  - Eight gates

Option 1 is shown in **Figure 4-7**.

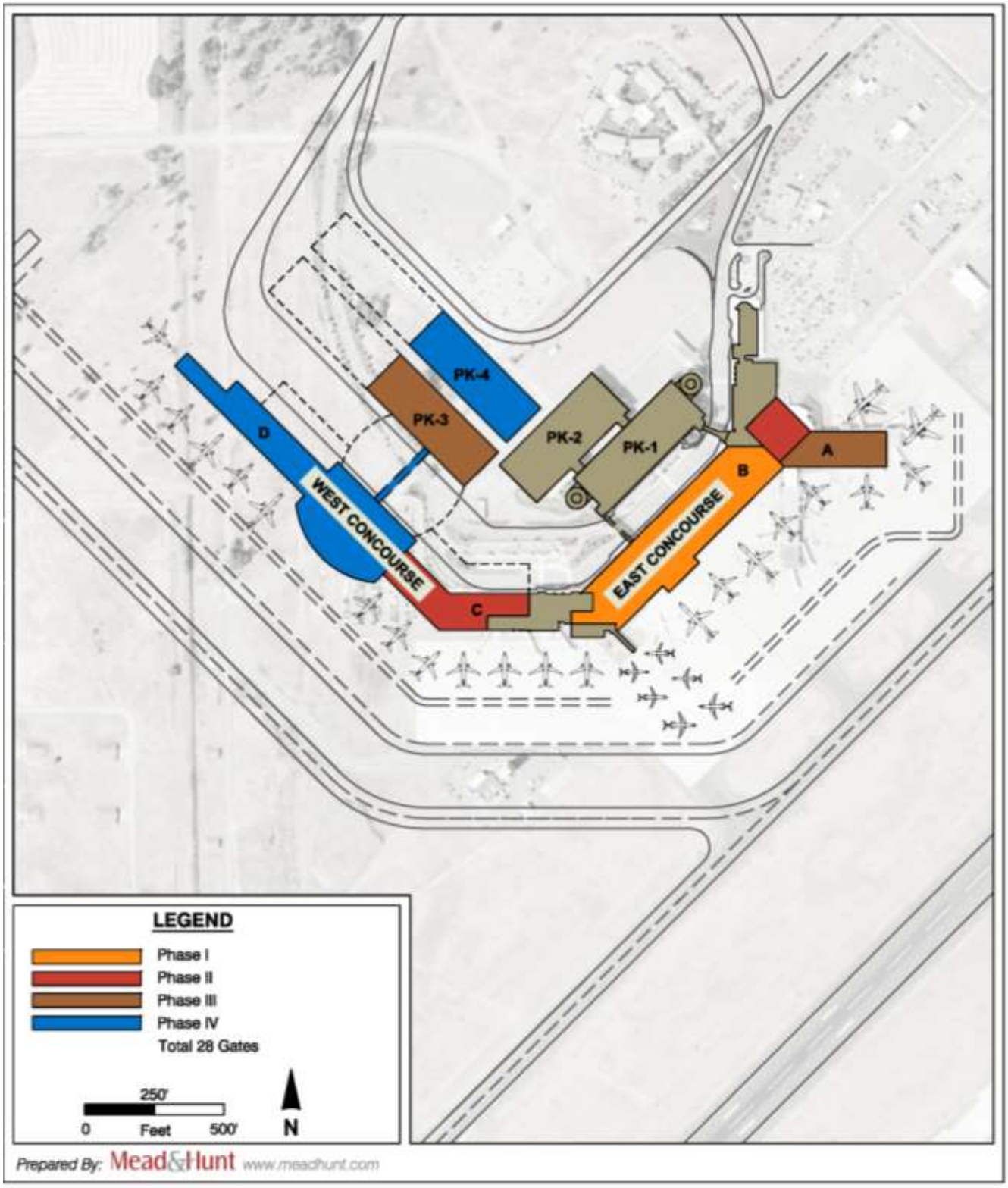


Figure 4-7

Airport Terminal - Option 1
Spokane International Airport

Terminal Option 2: Prioritize building a new terminal centered between the two parallel runways

Option 2 begins the construction west of Terminal C. This option is less disruptive to existing operation as and accelerates the transition to a midfield location. The priority will lie in adding gates northwest of Terminal C rather than reestablishing them at a refurbished Terminal A/B. Many of the interim steps outlined in Option 1, such as moving ticketing into the new Terminal D, will occur in Terminal C in Option 2.

Option 2, Phase 1 (2015): 15 gates required

Phase 1 adds new gates to Terminal C to allow the renovation of the Terminals A and B to happen with less impact on operations. The expansion of Terminal C will include an expanded ground floor ticket hall, an area for second floor circulation and a security checkpoint.

Table 4-14: Phase 2-1 Gate Distribution

Terminal	Number of Gates
A	5
B	6
C	13
Total	24

Key Elements Include:

- Expand Terminal C to include:
  - Four gates
  - Expanded ticket hall
  - Second level security checkpoint
  - Second level circulation area to connect into the future Terminal B

Option 2, Phase 2A (2020): 18 gates required

Phase 2A relocates Terminal B to the connector area between Terminals A/B and C. The ticketing for these gates will be provided by the expanded ticketing area of Terminal C. A new ground floor baggage area will be provided for Terminal B.

Table 4-15: Phase 2-2A Gate Distribution

Terminal	Number of Gates
A	5
B	3
C	13
Total	21

Key Elements Include:

- Demolish existing Terminal B
- Build half new Terminal B to include:
  - Three gates
  - Ground baggage area
  - Second level secure connection with Terminal C
  - Second level administration area
- Move Terminal A/B ticketing into new Terminal C

Option 2, Phase 2B (2020): 18 gates required

Table 4-16: Phase 2-2B Gate Distribution

Terminal	Number of Gates
A	0
B	5
C	13
Total	18

Option 2, Phase 2B expands the north end of Terminal B to include an FIS facility. This facility will be laid out to allow domestic flights use of the gates when they are not being used for international traffic. A loading bay will be added north of Terminal B and tied into the relocated maintenance and storage facility (previously the A/B baggage area).

Key Elements Include:

- Demolish Terminal A
- Expand Terminal B to include:
  - Two gates
  - FIS facility
- Add loading bay and facility support space (maintenance, storage and loading areas.

Option 2, Phase 3 (2025): 22 gates required

Table 4-17: Phase 2-3 Gate Distribution

Terminal	Number of Gates
A	0
B	5
C	13
D	4
Total	22

Option 2, Phase 3 expands the ticketing area for Terminal C to include a new terminal hub and center for the entire Terminal. This hub will contain ground floor ticketing and baggage handling with a second level security checkpoint, retail, and concessions. It will also serve as the secure side connection between Terminal B, Terminal C, and the future Terminal D.

A new third parking garage will be added to support the new central hub. It will contain the rental car facility, parking offices, and a second level check-in area with common use ticketing and baggage check. A second level pedestrian bridge will connect the third parking garage to the central hub. A covered canopy between the two will also be built for central pick-up and drop-off.

The first section of Terminal D will be added. The ground level of this terminal will also contain ticketing areas to support the central hub. At this point the terminal is prepared to efficiently use the future third runway.

Key Elements Include:

Add new central hub to include:

- Ground level concessions and greeter area
- Ground level baggage handling
- Second level security checkpoint
- Second level concessions and retail

New Terminal D includes:

- Four gates
- Ground level ticketing

Third parking garage to include:

- Check-in area
- Rental car facility
- Parking Office
- Pedestrian bridge connecting the third parking garage and the central hub
- Covered canopies for vehicle pick-up and drop-off

New vehicle circulation to include:

- New approach to the terminal in preparation for expanded terminal area
- New parking garage and parking lot circulation to separate parking and rental car activity from terminal pick-up and drop-off
- New return road to allow for easier loop circulation

Option 2, Phase 4 (2030): 27 gates required

The key elements for the twenty-year planning period are established in Phase 3. In Phase 4, additional gates are added to Terminal D to accommodate passenger growth beyond 20 years. A fourth parking garage may also be implemented if warranted by growing demand.

Table 4-18: Phase 2-4 Gate Distribution

Terminal	Number of Gates
A	0
B	5
C	13
D	11
Total	29

Key Elements Include:

- Expansion of Terminal D to include:
  - Seven new gates
  - New administration area
  - New conference center
- Fourth parking garage

Option 2 is shown in **Figure 4-8**.

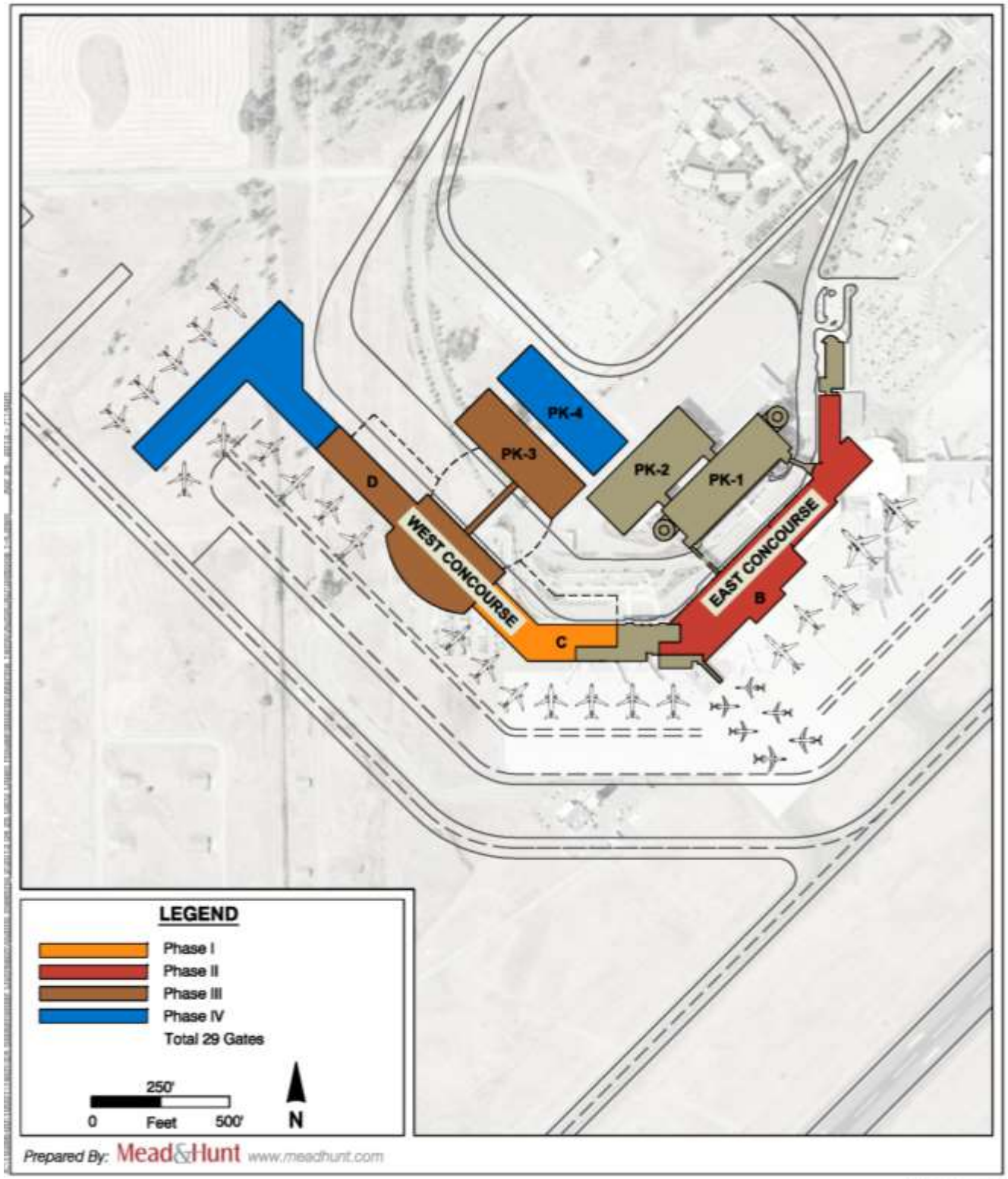


Figure 4-8

Airport Terminal - Option 2
Spokane International Airport

Terminal Option 3: Retain Focus on Runway 3-21

Terminal Option is presented to address how to meet the twenty-year anticipated demand centered only on existing Runway 3-21. Option 3 does not exclude the possibility of a future parallel runway but focuses the terminal improvements and expansions within the existing airside infrastructure.

Option 3, Phase 1A (2015): 15 gates required

A key element of Option 1 is to relocate Terminal B to the area between Terminals A/B and Terminal C. This will establish a secure connection between all gates; a consolidated ticketing area; consolidated bag claim and a consolidated security checkpoint. Consolidating these functions will streamline system operations and system back-up and will facilitate future common use growth. Phase 1 will require two sub-phases to allow for continued operations and to maintain existing ticketing-area capacity.

Table 4-19: Phase 3-1A Gate Distribution

Terminal	Number of Gates
A	5
B	3
C	9
Total	17

Key Elements Include:

- Build half of relocated Terminal B to include:
  - Three gates
  - Ground floor ticketing
  - Second level security checkpoint
  - Second level secure connection to Terminal C
  - Second level administration area
- Move Terminal A/B ticketing and administration into relocated Terminal B
- Demolish existing Terminal B gates and Terminal A/B ticketing

Option 3, Phase 1B (2015): 15 gates required

Key Elements Include:

Table 4-20: Phase 3-1B Gate Distribution

Terminal	Number of Gates
A	5
B	5
C	9
Total	19

- Build remainder of relocated Terminal B to include:
  - Two gates
  - Additional administration area
  - Additional concessions area
  - Eliminate existing Terminal A/B security checkpoint
  - Add secure connection between Terminal A and relocated Terminal B
- Relocate Terminals A/B and C bag claim into ground level of relocated Terminal B
- Move administration into upper area of Terminal B

- Move facilities (maintenance, storage, and loading) into old Terminal A/B bag claim area

Option 3, Phase 2 (2020): 18 gates required

In Phase 2, Terminal C will be expanded to allow for the reconfiguration of Terminal A. Terminal A will then be redeveloped with an FIS facility. This facility will be laid out to allow domestic flights to use the gates when they are not being used for international traffic. A loading bay will be added north of Terminal A and tied into the relocated maintenance and storage that will occupy the former Terminal A/B bag claim.

Table 4-21: Phase 3-2 Gate Distribution

Terminal	Number of Gates
A	6
B	5
C	11
Total	22

A new parking garage will be added to allow for the removal of the Parking Garage 1.

Key Elements Include:

- Expand Terminal C to include
  - Two gates
  - FIS Facility
  - Secure connection to Terminal B
- Demolish Terminal A
- Construct new Terminal A to include:
  - Four second level gates
  - Six ground boarding gates
- Add loading bay and support space
- Build third parking garage

Option 3, Phase 3 (2025): 22 gates

Option 3, Phase 3 expands relocated Terminal B toward the parking area so it will have enough capacity to act as the central hub for the entire Terminal complex. Additional gates will be added to complete Terminal A.

Table 4-22: Phase 3-3 Gate Distribution

Terminal	Number of Gates
A	6
B	5
C	11
Total	22

The first parking garage will be removed to make room for the terminal expansion and ease traffic congestion in the terminal area. The second parking garage will be reconfigured to accommodate check-in functions including ticketing and baggage check.

A second level pedestrian bridge will connect the second level hub to the second parking garage. A covered canopy between the two will also be built for central pick-up and drop-off. A new rental car facility will be added north of the second parking garage that will also house the parking office.

Key Elements Include:

- Demolish the first parking garage
- Expand relocated Terminal B to include:
  - Second level entry and concession areas
  - Ground floor greeter area
  - Bridge connection between relocated Terminal B and the second parking garage
  - Covered canopies for vehicle pick-up and drop-off
- Add new entry lounge and parking check-in to relocated Terminal B
- Renovate second parking garage to include:
  - Second level area for future check-in
  - New rental car and parking office complex
- New vehicle circulation to include:
  - New terminal approach to prepare for expanded terminal area
  - New parking garage and parking lot circulation to keep parking and rental car activity separate from terminal pick-up and drop-off
  - New return road to allow for easier loop circulation

Option 3, Phase 4 (2030): 27 gates required

The fourth phase allows the airport to meet the twenty-year passenger projections centered on existing Runway 3-21. The new Terminal D is constructed at the elbow formed by the Terminal B-C connection.

Ground boarding will be relocated to the Terminal C expansion area.

Table 4-23: Phase 3-4 Gate Distribution

Terminal	Number of Gates
A	6
B	5
C	10
D	7
Total	28

A fourth parking garage may be added as required to handle additional parking demands near the terminal.

Key Elements Include:

- Relocate ground boarding from Terminal C to Terminal A
- Construct new Terminal D to include:
  - Seven gates
- Build fourth parking garage

Option 3 is shown in **Figure 4-9**.

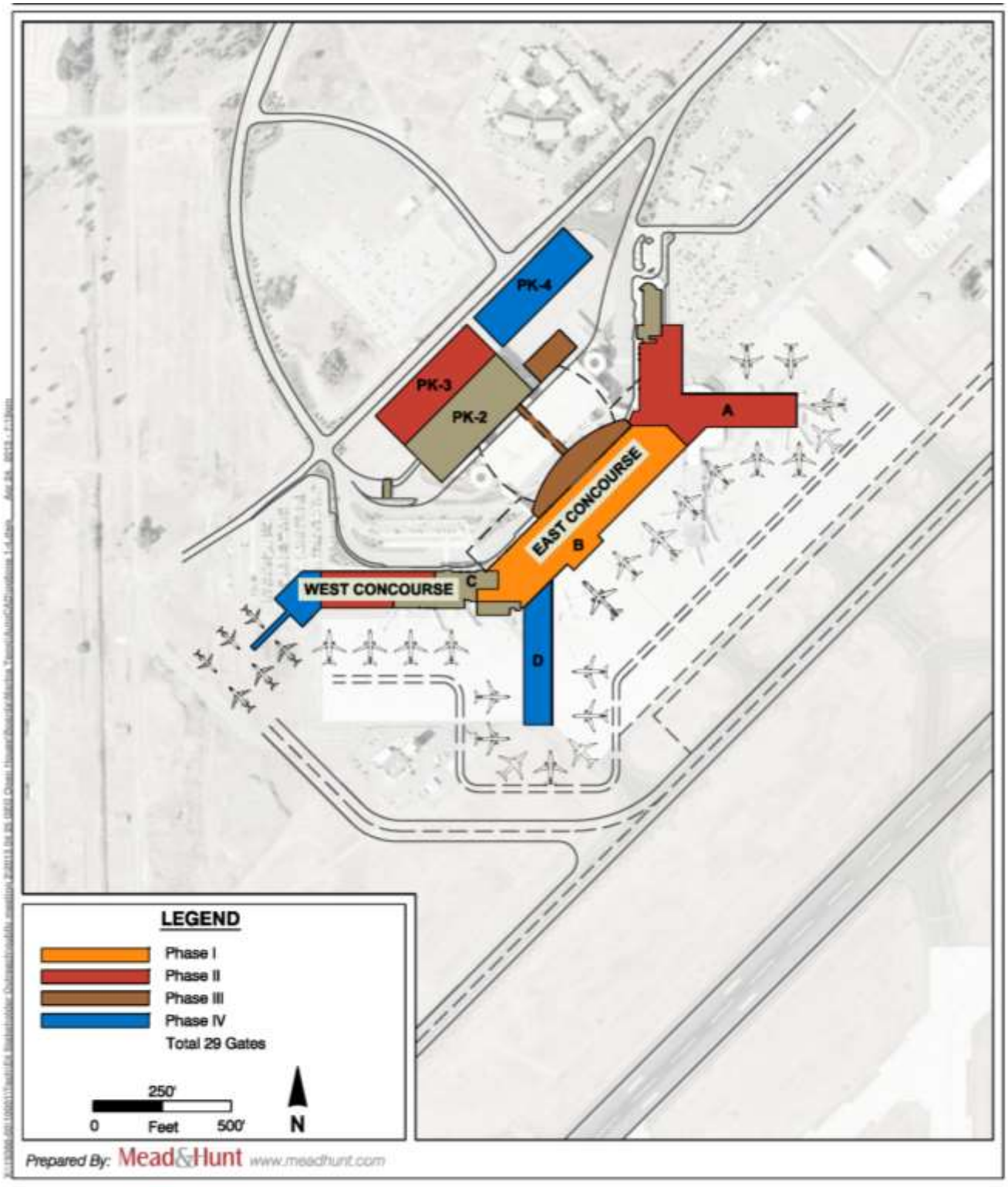


Figure 4-9

Airport Terminal - Option 3
Spokane International Airport

Terminal Option 4: Consolidate and expand from Terminal C hub.

Terminal Option 4 is presented to address how to meet the twenty-year anticipated demand while centralizing terminal development closer to Terminal C. This option is a hybrid of Options 1, 2, and 3 where existing runway and apron areas are maximized. In addition, centering development around existing Terminal C allows for balanced future development towards the third runway.

Option 4, Phase 1 (2015): 16 gates required

A key element of Option 4 is to reconfigure Terminal C to become the new center of the passenger terminal. Ticketing will remain on the ground floor while a single security checkpoint will be located on the second floor. Consolidating the SSCP will enhance TSA staffing, minimize queuing and wait times, and allow for greater flexibility in complying with future TSA regulations. Phase 1 will commence building a sterile connection between Terminals A/B and C.

Key Elements Include:

- Construct portion of new centralized Terminal C to include:
  - Reconfigured ground boarding area
  - Introduction of East Terminal
  - Ground floor consolidated ticketing
  - Second level consolidated security checkpoint
  - Second level secure partial connection
  - ATO offices/outbound baggage
  - Second level main sterile concessions
  - Ground level public concessions
  - Relocated/consolidated TSA offices

Table 4-29: Phase 4-1 Gate Distribution

Terminal	Number of Gates
A	5
B	4
East	7
Total	16

Option 4, Phase 2 (2020): 19 gates required

The focus of this phase will be to complete the Terminal C west addition to the west and commence construction of a new east Terminal. The end result of this phase will be to consolidate the bag claim areas and airport administration.

Table 4-30: Phase 4-2 Gate Distribution

Terminal	Number of Gates
East	10
West	4
A	5
Total	19

Key Elements Include:

- Construct portion of East and introduction of partial West Terminals
- Demolish existing Terminal B
- Consolidate bag area
- Complete ground boarding re-development
- Construct second floor sterile connection between East and West Terminals
- Construct second floor airport administration offices/conference rooms
- Relocate law enforcement and construct new EOC area
- Construct automated people mover system
- Demolish existing Terminal A/B security checkpoint
- Establish temporary sterile connection to existing Terminal B

Option 4, Phase 3 (2025): 22 gates required

The focus of this phase will be to expand the West Terminal to include new gates and ground floor support areas. The East Terminal will also be expended to gate capacity needs. This phase contains the largest impacts to the surrounding landside areas with the addition of a new structured parking garage and extensive existing facility demolition.

Table 4-31: Phase 4-3 Gate Distribution

Terminal	Number of Gates
East	14
West	8
Total	22

Key Elements Include:

- Construct portion of East and West Terminals
- Construct Terminal concessions
- Moving walkways and/or people mover tram
- Demolish existing Terminal A
- Demolish Terminals A/B rotunda
- Construct new parking garage PK-3
- Demolish existing parking garage PK-1
- Relocate rental car facilities into PK-3 ground floor
- Demolish existing car rental facility
- Reconfigure roadway/vehicle circulation area

- Install automated people mover system
- Implement common use check-in and luggage area at PK-3
- Construct covered drop off area at terminal landside
- Construct pedestrian connection between parking and terminal hub

Option 4, Phase 4 (2030): 27 gates required

The focus of this phase will be to expand west Terminal to include 5 new gates and to expand the apron/ramp area to serve new gates.

Key Elements Include:

- Expand west Terminal with 5 new gates
- Construct Terminal concessions
- Moving walkways and/or people mover tram
- Expand apron west
- Add new parking garage PK-4/5 as necessary

Option 4 is shown in **Figure 4-10**.

Table 4-32: Phase 4-4 Gate Distribution

Terminal	Number of Gates
East	14
West	13
Total	27

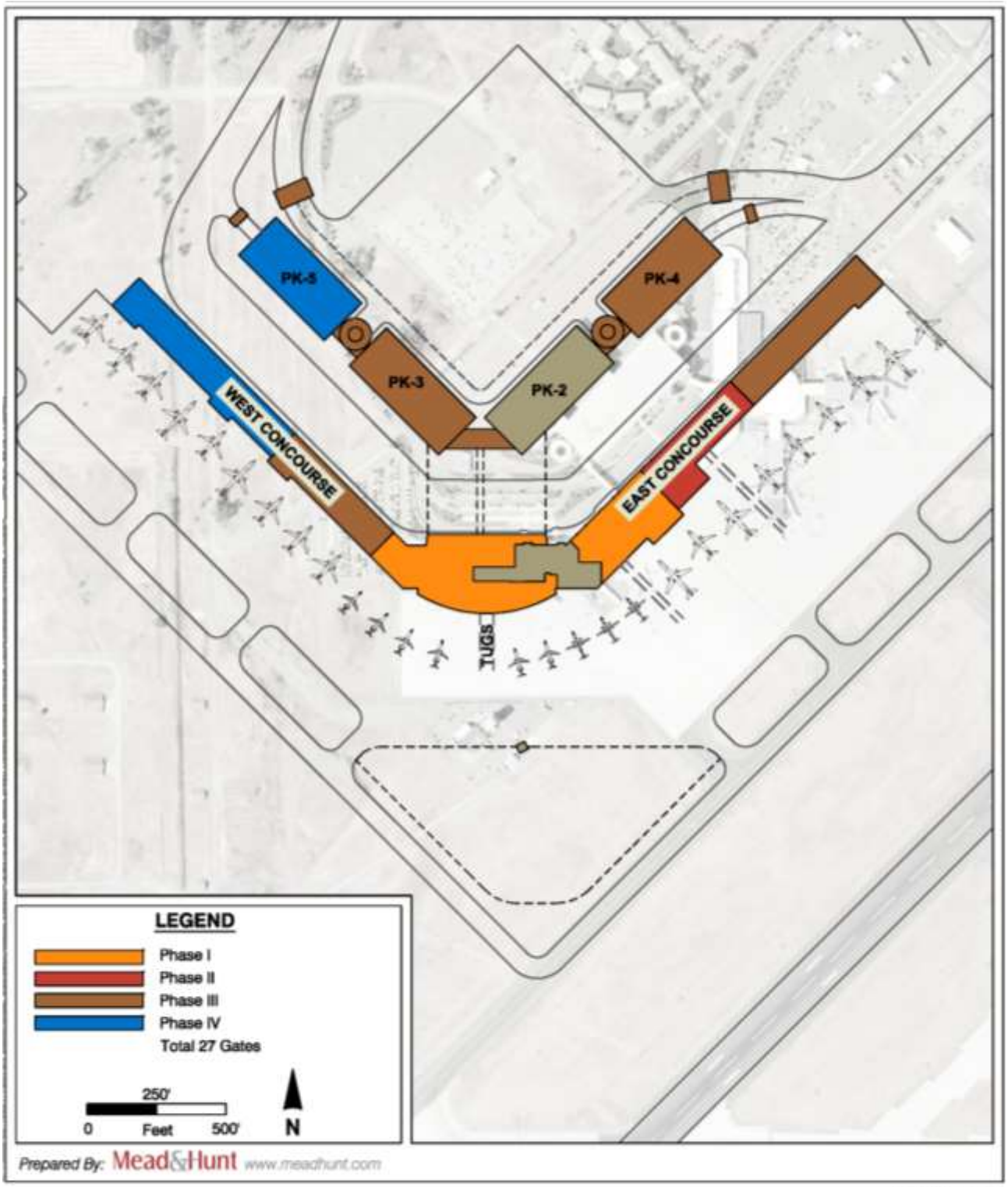


Figure 4-10

Airport Terminal - Option 4
Spokane International Airport

Terminal Option 5 (Selected Alternative): Retain A/B, Consolidate/Expand Connector and Terminal C

Using the Options 1-4 as background, the Airport conducted terminal planning program with the consulting firm of Arthur Debowy, AIA, to create a long-term vision for the ultimate passenger terminal configuration and location, along with defining short-term and mid-term improvements which will be necessary to operate the terminal in its existing location. In Option 5, Terminal A/B would remain in service until the capacity of the entire terminal complex is reached, then the terminal operations will be moved to a new midfield location. Based on the forecasts and the capacity of the existing facilities, the demand-capacity driven relocation is expected to occur between 2025 and 2030. This concept proposes immediate improvements to the existing terminal complex to be completed over several construction cycles between 2015 and 2017.

Key Elements (Short-Term) include:

- Expansion of terminal connector to include:
  - Consolidated baggage claim with expanded bag capacity
  - U.S. customs center with dedicated loading bridge access and convertible international/domestic baggage claim area.
  - A portion of the expanded building area may include additional floor levels to accommodate offices and other public space.
- Expand Terminal C:
  - The public area of Terminal C will be expanded along the terminal roadway to accommodate a relocated check-in ticket lobby.
- Security Check Point Improvements:
  - Terminal A/B security checkpoint to be relocated and expanded to the present A/B bag claim area to provide space for an additional security array and faster processing.
  - Terminal C security checkpoint to be expanded with an additional security array to include present ticketing/check-in lobby space.
- Provide additional concessions:
  - Convert the present A/B security check-point into pre/post-security concession space.
  - Convert the present C security check-point into pre/post-security concession space.
- Relocate rental car facilities to garage:
  - Includes new raised crosswalk with canopy.
- Construct New Second Level Bridge to both garages

Short term elements for Option 5 are shown in **Figure 4-11**.

Key Elements (Long Term) include:

- New Mid-field Terminal Building construction
- Separated landside public space
  - Consolidated check-in
  - Consolidated bag claim
  - Consolidated security processing
  - Transportation connectivity
  - Garage and street access
  - Public concessions
- Separated airside secure space
  - Hold rooms and gates
  - Concessions
  - Customs processing
  - Aircraft parking on all sides
- Efficient access to both runways
- Expandable satellites supporting unconstrained growth

The ultimate configuration of Option 5 is shown in **Figure 4-12**.

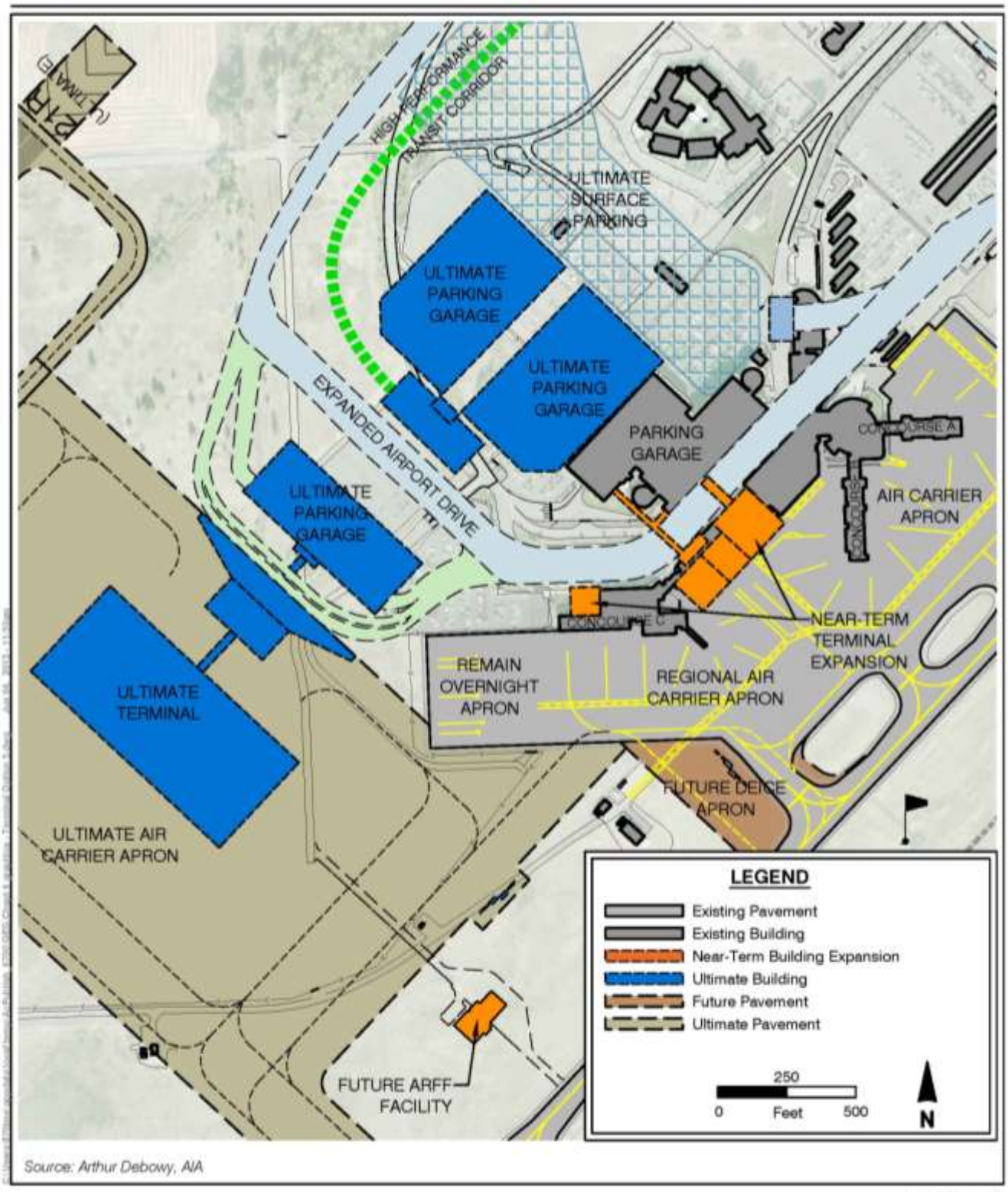


Figure 4-12

Terminal Option 5 (Ultimate)

Spokane International Airport

4.8 SUMMARY OF TERMINAL FACILITY REQUIREMENTS AND RECOMMENDATIONS

In consideration of the ultimate airside configuration proposed for the Airport with parallel primary runways, the selected terminal alternative, Option 5, provides for a long-term midfield location for the passenger terminal area. In this option, concerns with existing building systems are resolved with a cost-conscious approach, while issues most visible to the traveling public are aggressively addressed, including the availability of concessions, security wait times, and walking distances. Since a future replacement terminal will be constructed at a different site, the construction impacts on terminal operations will be minimized.

That being said, it is important to recognize and document Options 1, 2, 3, and 4, and the background that led to their development. The Airport will continue to move through an evolution of thought process that will take it from the conception of the plan for short- and long-term terminal area improvements, to the point where those plans result in actual on-the-ground construction. The first four alternatives immediately address the building systems problems that impact existing Terminal A/B. Some of the ideas expressed in Options 1-4 may be of benefit as more detailed terminal improvement planning is undertaken over the next few years. Both Option 4 and Option 5 include short-term changes to the terminal building footprint that are similar and produce similar cost expectations.

In the short-term, the Airport will undertake a more comprehensive planning and programming study to refine the terminal project, including the use of the existing terminal area when and if the terminal is relocated to a midfield position. This has been and will continue to be an evolutionary planning effort.

It should be noted that the ATCT may be relocated to a midfield location; however, this relocation will be driven by the construction of the new parallel runway, and is independent of construction considerations surrounding the relocation of the passenger terminal building. Relocation of the ATCT will not likely occur during the existing building's life cycle.

At its most basic level, Option 5 is based on the recommendation that space will be reserved for an ultimate midfield terminal complex, which is the most functionally efficient location in consideration of the ultimate airside concept which exhibits parallel primary runways.

GEG plans to undertake a terminal area plan in 2014. This plan will provide a more detailed analysis of the capabilities of existing infrastructure, and expand on improvement options presented in this chapter.

CHAPTER 5

LANDSIDE FACILITIES

5.0 INTRODUCTION

This chapter focuses on the landside circulation and access system at the Spokane International Airport (GEG or "the Airport"), and includes the following four components.

- Airport Roadway and curbside facilities.
- Parking facilities including public, employee and rental cars.
- Airport ground access.
- Public transportation.

Existing traffic conditions and planned roadway improvements are discussed in **Chapter 1**. Individual facility requirement needs or improvements are derived from demand forecasts provided in **Chapter 2**. Consistent with the industry standard, landside facility requirements are largely influenced by passenger demand and by the multiple modes of access to and from the Airport.

Passenger enplanement forecasts during peak periods are driving the planned landside facility improvements. Passenger enplanement levels are forecasted through the year 2030, and are expected to have a compound annual growth rate (CAGR) of 3.42%. This growth rate nearly doubles the number of enplanements over the next 20 years, which will require additional parking facilities for private automobiles, taxis, shuttles, and rental cars.

5.1 TERMINAL ACCESS AND CURBSIDE FACILITIES

Airport Drive is the primary roadway serving the terminal facility at GEG. This section focuses on the functionality of the Airport Drive in the vicinity of the terminal and the effectiveness of the existing curbside facilities at the terminal building. A 2010 traffic study conducted by DKS Associates (2010 Traffic Study) indicated that Airport Drive has an Average Daily Traffic (ADT) volume of 5,500 vehicles per day. The 2010 Traffic Study also inventoried landside signage, and made improvement recommendations. As passenger volumes increase at the terminal building, traffic flow through the terminal areas as well as curbside facilities will become increasingly significant.

The 2010 Traffic Study classifies the curbside facilities as "congested" during peak travel periods because of the number of vehicles waiting to load and unload passengers. Airport management has identified the need to modify the configuration of the travel lanes, signage and posted speed limits nearest the terminal area. Airport management intends to designate curbside facilities according to use, such as shuttle bus drop-off zones, in specific areas. Curbside designations for separate uses are intended to improve traffic flow as shuttle busses that take longer to load and unload will not block private vehicles, which typically do not take as long to load and unload.

Short-term recommendations place emphasis on the on the following improvements.

- Improving wayfinding and roadway signage.
- Enhancing the landscaping in the medians and on the sides of the road.
- Providing designated taxi, shuttle, and charter bus pick up and drop off areas.

Passengers provided several suggestions regarding their desire to see fueling and convenience stores closer to the terminal. GEG has identified suitable sites for gas station and convenience store development to accommodate passenger preference.

It is expected the existing terminal landside infrastructure will be sufficient for many years given the forecasted level of passenger demand. Larger improvement projects are expected after the new runway, described in Chapter 3, and new midfield terminal, described in Chapter 4, are constructed.

Short term improvements are shown in **Figure 5-1**.

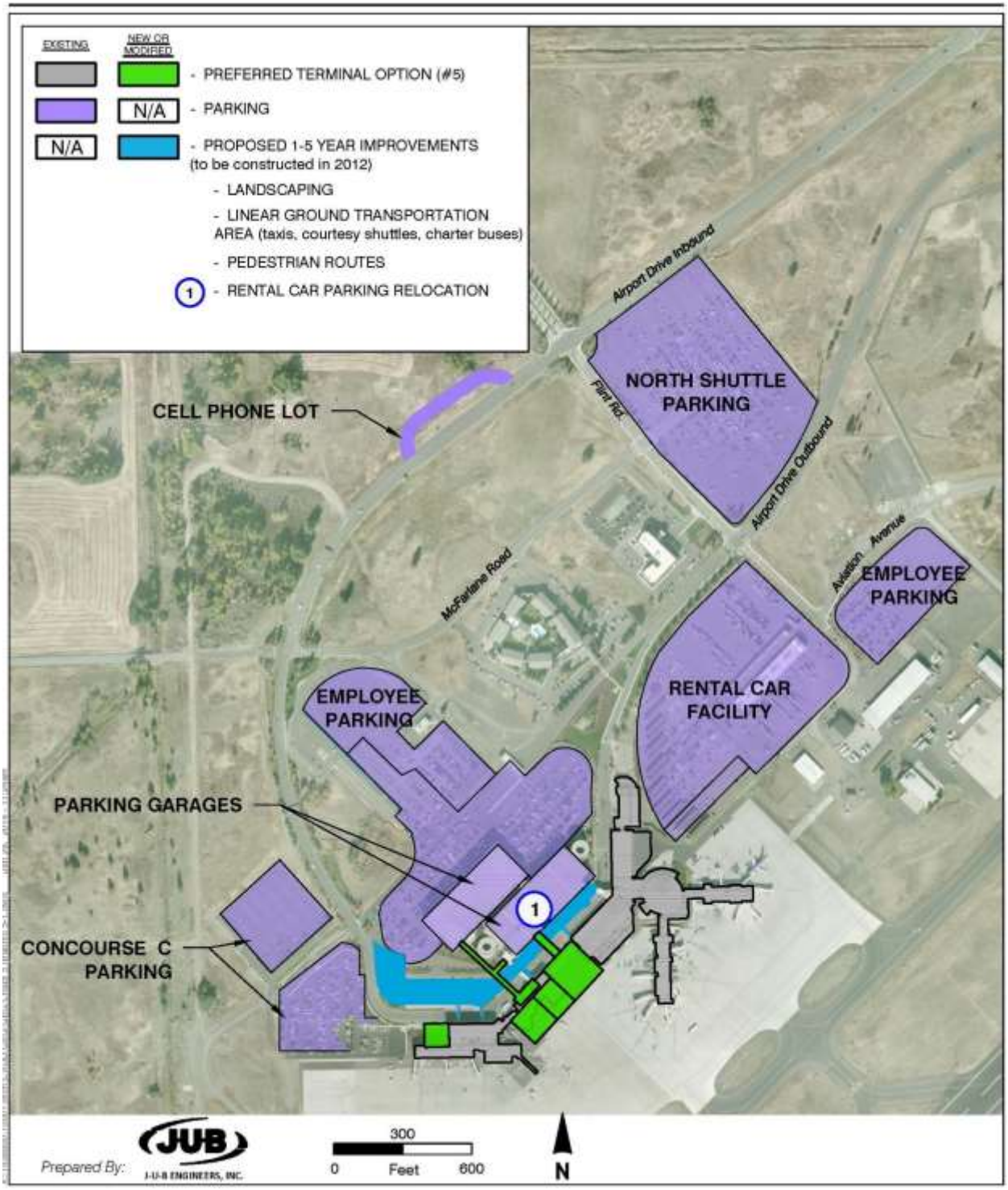


Figure 5-1

Short-Term Access Improvements

Spokane International Airport

5.2 PARKING FACILITIES

Vehicle parking facilities at GEG include spaces for public parking, employee parking, and rental car parking. Public parking consists of two parking garages with 2,600 parking spaces, three long-term surface parking lots with 1,700 parking spaces, and two short-term surface parking lots with 70 parking spaces. There are two employee parking lots with 1,000 parking spaces, located near Flint Road and McFarland Road. There are 1,900 rental car parking spaces.

The public parking facilities average 3,000 occupied spaces per day. Airport management records indicate that up to 4,000 parking spaces, 750 parking employee parking spaces, and 1,600 rental car parking spaces were occupied during peak periods in 2010.

There are eight rental car companies operating at GEG in 2013. The pick-up and drop off facilities are shared between the rental car companies. The pick-up and return lot is located northeast of the terminal facilities, and contains covered and uncovered parking spaces. Access to the return lot is via Airport Road and Flint Road. The rental car facilities also include parking spaces designated for the servicing of vehicles called the quick turnaround area (QTA).

Airport management has a number of concerns with existing parking facilities and operations, including the following.

Airport maintenance closes down the double helix ramps used to access Parking Garage One when heavy snowfall accumulates. The double helix ramps are inaccessible to snow plows and the presence of ice and snow is hazardous to other vehicles. The stairs providing access to Parking Garage One are typically shut down in the winter due to snow and ice accumulation as well, which sometimes causes pedestrians to walk up the double helix ramps to access their vehicles. Airport management recognizes the safety concerns associated with pedestrians and vehicles occupying the ramps during snowy and icy conditions, and is developing alternatives to solve this problem. Alternatives include the addition of screening on the existing helixes and stairwells, demoing the existing helixes, or building a new parking garage without helix structures.

Parking Garage Two is newer than Parking Garage One, but there are functionality concerns with this structure as well. Drivers have reported becoming disoriented when parking due to insufficient signage within the structure. Drivers changes levels on ramps that go up and down two stories, which also causes confusion for some. Some passengers have commented that it is difficult to find a pedestrian route to the terminal after parking in Parking Garage Two.

It is expected that parking demand will increase proportionally to projected passenger enplanement demand. Using this methodology, public and employee parking demand are expected to exceed the existing parking facility capacities within ten years. Parking demand forecasts are shown in **Table 5-1.**

Table 5-1. Summary of Additional Parking Spaces Needed					
Parking Facility	Existing Supply (March 2011)	Estimated Additional Parking Spaces Needed			
		2015	2020	2025	2030
Public	6,869	0	0	334	1,753
Employee	1,063	0	0	47	163
Rental Car	1,910	0	279	709	1,225
Total	9,842	0	279	1,090	3,141

(Source: J-U-B ENGINEERS)

It is expected that there are an adequate number of parking spaces available through 2020 in the public and employee parking facilities; however, there will be a need for 280 rental car parking spaces. Near-term terminal improvements, discussed in Chapter 4, locate the 280 rental car parking spaces inside Parking Garage One. Parking demand forecasts expect that all three categories of parking will need additional parking spaces in 2025. The location and type of parking facility depends on the progress of the planned implementation of a new midfield passenger terminal. Until the midfield terminal is built, it is recommended that the Airport place additional surface parking within the infill area created by Airport Drive. After the midfield terminal is built, it is expected that landside facilities will be reconfigured. Modifications and improvements are to be made to vehicle circulation roads and parking facility locations, which will allow for the additional parking capacity.

5.3 ULTIMATE TERMINAL ACCESS AND PARKING CONCEPT

The area located along Airport Drive can be developed to accommodate additional parking demand through 2030, as shown in **Figure 5-2**. It is expected that future planning exercises will assess and refine parking facility demand and development. A conceptual reconfiguration of terminal landside facilities has been developed to guide long-term planning. This development considers the proposed new runway and midfield terminal. Long-term landside improvements place emphasis on the following.

- Reconfiguring Airport Drive to access the midfield terminal location and provide additional space for infill facility development, including parking, hotels, transit, and rental car facilities.
- Consolidating the northernmost inbound and outbound road segments northeast of the terminal to enhance traffic circulation.
- Reserving property for high performance transit right of way.
- Improving separation of airport vehicles, private vehicles, and local non-airport traffic to enhance efficiency and safety.
- Establishing a long-term development plan that can accommodate future demand.

5.4 OTHER ROADWAY ACCESS CONSIDERATIONS

GEG is connected to its service area via interstate, U.S., and state highways, including Interstate 90 and U.S. Highway 2. Major roadways tying into the system of highways include Airport Drive, Flint Road, Spotted Road and Geiger Boulevard. Primary access into and out of the Airport's Business Park area is provided by Flightline Boulevard, Pilot Drive, and Spotted Road.

Airport management has identified three concerns pertaining to existing and future vehicle access and circulation. The first concern is that peak traffic volumes on eastbound U.S. Highway 2 cause delays to left-turning traffic at the Flint Road and Spotted Road intersections. Vehicle accidents along U.S. Highway 2 at Flint Road have elevated the safety concerns in this area. The second concern is that Geiger and Flightline Boulevards routinely experience congestion associated with heavy truck traffic. The third concern is that development of the new runway could result in the need to realign roadways that provide access to GEG, which could influence terminal building development.

Roadway improvements are intended to maintain or enhance the level of service (LOS) and safety conditions of access roads serving GEG. LOS is a metric that quantifies traffic flow and congestion. LOS categories are defined in the Transportation Research Board Special Report No. 209*, The Highway Capacity Manual* (TRB Report 209). TRB Report 209 defines LOS categories alphabetically from A to F. LOS A indicates little to no vehicle delay, and LOS F indicates significant vehicle delay and congestion which may lead to system breakdown. LOS is a temporal rating, and changes based on conditions. Most roads have LOS A during slow periods, and then experience a LOS degradation during periods of higher demand. LOS during peak periods is the most critical.

The 2010 Traffic Study rated Airport Drive at Flint Road (inbound) as LOS A for morning peak hour (5:00a.m.) and LOS C for midday peak hour (12:15p.m.). It is recommended that GEG access roadway improvement projects are designed to provide LOS C or better during peak periods.

Transportation planning is a regional process, and as a regional public facility, landside facilities at GEG are planned to integrate with transportation plans prepared by other entities. Other transportation plans considered include the Spokane Regional Transportation Council West Plains/Spokane International Airport Sub-Area studies, and Washington State Department of Transportation (WSDOT) studies. These improvements are shown in **Figure 5-3**, and described below.

- **21st Avenue East Extension** –WSDOT has studied a three-lane extension of 21st Avenue to provide congestion relief to U.S. Highway 2 through City of Airway Heights. The alignment of the extension may impact the Airport Business Park. There are several challenges of connecting the east end of 21st Avenue with U.S. Highway 2 while maintaining separation of U.S. Highway 2 and Airport Drive interchange. West of the Airport Drive interchange there would be four lanes on U.S. Highway 2, four lanes on Airport Drive. 21st Avenue will have either two or four lanes that will feed on to U.S. Highway 2 to the east of the Airport Drive interchange. The 21st Avenue Extension between Hayford Road and Flint Avenue would provide a new access route to the Airport that was lost when McFarlane Road was closed.

- **U.S. Highway 2 and Flint Road Traffic Signal** – Traffic associated with the development along U.S. Highway 2 causes delays and automobile accidents at the intersection with Flint Road. It is expected that delays and the risk of accidents will increase as development continues. The installation of a traffic signal has been identified as the appropriate mitigation technique at this location.
- **U.S. Highway 2 and Spotted Road Safety Improvements** – An increase in vehicle traffic at the intersection of U.S. Highway 2 and Spotted Road has come with an increase in vehicle accidents. U.S. Highway 2 has a rise to the east of the intersection, which makes it difficult for northbound traffic on Spotted Road to see oncoming vehicles on U.S. Highway 2. One safety improvement under consideration is prohibiting left turns from Spotted Road on to U.S. Highway 2. This technique may decrease accidents at the Spotted Road intersection, but it is expected that traffic looking to turn left will use Flint Road instead. This will increase traffic volumes at the U.S. Highway 2 and Flint Road intersection, increasing the risk of accident. Limited eastbound line of sight prohibits the installation of a traffic signal at this location. This intersection remains under evaluation.
- **Hayford Road Realignment** – Hayford Road will need to be realigned to accommodate proposed runway. Realignment techniques include relocating the surface road, or tunneling the road underground. It is recommended that the Airport continue to coordinate with local transportation planners to keep realigned Hayford Road outside of the runway protection zones of existing and planned runways. WSDOT is considering improvements to the interchange of Interstate 90 and Medical Lake Road. Realignment of Hayford Road should consider maintaining access to this interchange, which would give planned westside airport development direct access to Interstate 90.
- **Flint Road and Inbound Airport Drive Improvements** – The intersection of Flint Road and inbound Airport Drive is classified as LOS B, but LOS is predicted to decline to LOS D within the 20-year forecast period. The need for improvements to this intersection relates more to accident protection than safety. One technique being considered is reducing speed limit on inbound Airport Drive east of Flint Road. Another technique is prohibiting traffic on Flint Road from crossing Airport Drive. This improvement may improve safety, but it will increase driving distances and the number of vehicles on Airport Drive.
- **Airport Drive and Spotted Road** – There are no capacity issues on the inbound and outbound Airport Drive intersections with Spotted Road, but these intersections have a history of vehicle accidents. Several safety improvements have been completed including the addition of rumble strips on Spotted Road and flashing lights on the stop signs. One safety improvement under consideration is an overpass to eliminate the intersections. If this improvement moves forward, it is recommended that both directions of Airport Drive are relocated together instead of constructing two bridges.

- **East Side Access Improvements** – The Airport Business Park is located on airport property east of Spotted Road. Additional road access is needed as part of the development. New roadways should be planned to integrate with existing and planned road developments.
- **I-90 and Geiger Interchange Capacity Improvements** – The Interstate 90-Geiger Road provides significant service to the east side of the Airport, and experiences congestion and delay during peak periods. One alternative relocates the westbound Interstate 90 off-ramp to the east, which allows installation of turn lanes and a traffic signal at the intersection of Grove Road and Geiger Boulevard. Another alternative under consideration is to install a roundabout at the intersection of Geiger Boulevard and Grove Road.
- **Thorpe Road Connection** – This connection which would cross over Interstate 90 and connect Electric Avenue west of I-90 to Thorpe Avenue east of Interstate 90. It is expected that this improvement will relieve congestion on Geiger Road and at the Interstate 90-Geiger Road interchange.

5.5 PUBLIC TRANSPORTATION ACCESS

Spokane Transit Authority (STA) Route 60, *Airport/Browns Addition*, connects GEG to the Spokane public transit network. Service is provided every 30 minutes from 6:00a.m. to 6:00p.m., and every hour from 6:00p.m. to 10:00p.m. on weekdays. STA serves GEG hourly between 6:00a.m. and 10:00p.m. on Saturdays. Service on Sundays and Holidays is hourly from 6:00a.m. to 6:00p.m., and every 30 minutes between 6:00p.m. and 10:00p.m. No changes to bus service are expected in the near-term.

The Airport is preserving space for a high performance transit corridor, which may have a stop at GEG. It is recommended that the Airport continue to preserve this space.

5.6 SUMMARY

Major landside improvement projects at GEG are expected to occur during the long-term, and several street access projects are being conducted by other organizations. Airport-specific landside improvement projects include the following.

By 2020:

- Construct a separate commercial vehicle pick-up and drop-off lane, improve signage access road signage, and street side and median landscaping.
- Relocate and expand the parking garage office.
- Relocate 280 rental car spaces to Parking Garage One.
- Construct access and internal roadways within the Airport Business Park.
- Continued safety improvements and project support on surface roads.

By 2030:

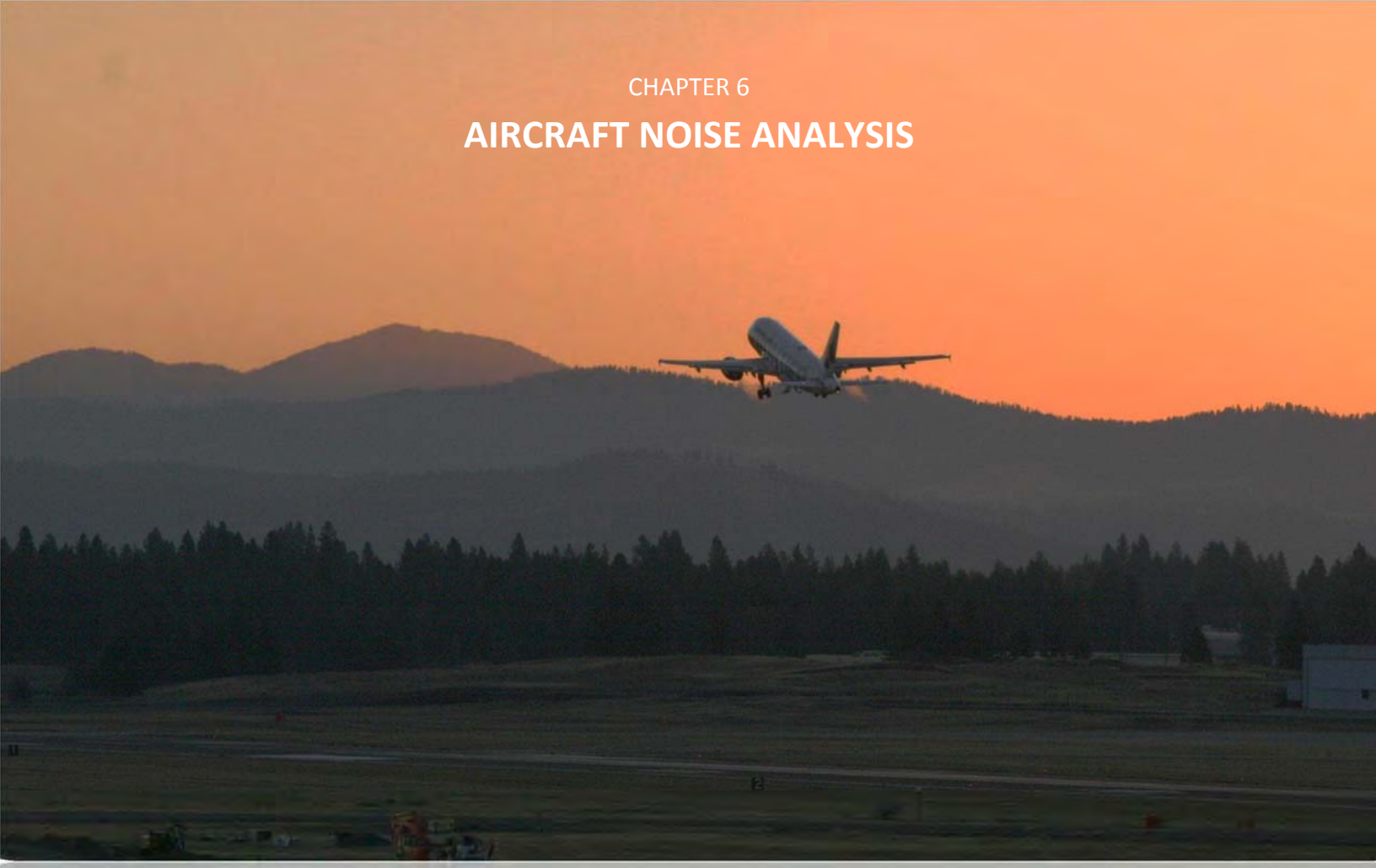
- Construct additional surface parking as needed between inbound and outbound Airport Drive.

Beyond 2030:

- Realign Hayford Road to accommodate new runway.
- Combine inbound and outbound Airport Drive at Spotted Road; and construct an overpass.
- Realign Airport Drive to access new midfield terminal, provide additional infill space for parking, improve terminal complex circulation.
- Preserve a corridor to connect new midfield terminal with potential regional high performance transit.

CHAPTER 6

AIRCRAFT NOISE ANALYSIS



6.0 INTRODCUTION

Aircraft noise contours were developed to help visualize sound generated by aircraft operations as part of the Airport Master Plan. Aircraft noise contours are used to support land use compatibility measures and to analyze how the Airport influences nearby properties. The noise contours will identify and quantify the potential land use incompatibilities associated with existing and future operations on the existing runway layout, and ultimate operations following implementation of a new Runway 3L/21R.

Noise contours are presented in three scenarios and data used to generate the contours is included. Also included is a discussion on the effects airport noise has on a population and how metrics are used to help quantify aircraft noise.

6.1 AIRCRAFT NOISE

Aircraft noise is one of the more noticeable attributes associated with living and working near an airport. To understand aircraft noise and its effect on people, it is important to understand the physics of sound. Sound is a type of energy which travels in the form of a wave. Sound waves create minute pressure differences in the air which are recognized by receptors including the human ear and microphones. Sound waves can be measured using decibels (dB) to measure the amplitude or strength of the wave and Hertz (Hz) which measures the frequency or pitch of the wave.

The strength, or loudness, of a sound wave is measured using decibels on a logarithmic scale. The range of audibility of a human ear is 0 dB (threshold of hearing) to 125 dB (pain begins). The use of a logarithmic scale often confuses people because it does not directly correspond to the perception of relative loudness. A common misconception is that if two noise events occur at the same time, the result will be twice as loud. In reality, the event will double the sound energy, but only result in a 3 dB increase in magnitude. For a sound event to be twice as loud as another, it must be 10 dB higher.

Scientific studies have shown that people do not interpret sound the same way a microphone does. For example, humans are bias and sensitive to tones within a certain frequency range. The A-weighted decibel scale was developed to correlate sound tones with the sensitivity of the human ear. The A-weighted decibel is a "frequency dependent" rating scale which emphasizes the sound components within the frequency range where most speech occurs. This scale is illustrated in **Figure 6-1**, Approximate Decibel Level of Common Sound Sources, which lists typical sound levels of common indoor and outdoor sound sources.

When sound becomes annoying to people, it is generally referred to as noise. A common definition of noise is unwanted sound. One person may find higher levels of noise bearable while others do not. Studies have also shown that a person will react differently to the same noise depending on that person's activity at the time the noise is recognized, e.g., when that person is sleeping.

6.1.1 Day-Night Noise Level (DNL)

While the A-weighted decibel scale measures human perception of loudness, it does not account for the degree of annoyance based on the duration of a noise event or the differences in sensitivity associated with a person's activity during a noise event.

Noise generated by the operation of aircraft to, from, and around an airport is generally measured in terms of cumulative noise levels of all aircraft operations. Cumulative noise level metrics provide a single measure of the average sound levels in decibels for any point near an airport when exposed over the course of a day. A variety of cumulative noise level metrics have been formulated to provide a single measure of continuous or multiple noise events over an extended period of time. The standard metric used to measure noise from aircraft is the Day-Night Noise Level, or DNL.

The DNL penalizes any activity which takes place in the nighttime (10:00 PM – 7:00 AM) by increasing the decibel level by 10 dB. Since the decibel scale uses a base-10 logarithm, each nighttime operation is equivalent to 10 daytime operations. The rationale for this adjustment is based on the reduced ambient noise at these times, and thus the increase in sensitivity to the human ear. This increase in sensitivity creates a perceived notion that aircraft are louder and more disruptive at night. A summary of effects that noise has on people was developed by the Federal Interagency Committee on Noise in 1992. This is presented in **Figure 6-2**, Summary of Noise Effects, which gives a better understanding of what type of noise exposure is expected at each decibel level.

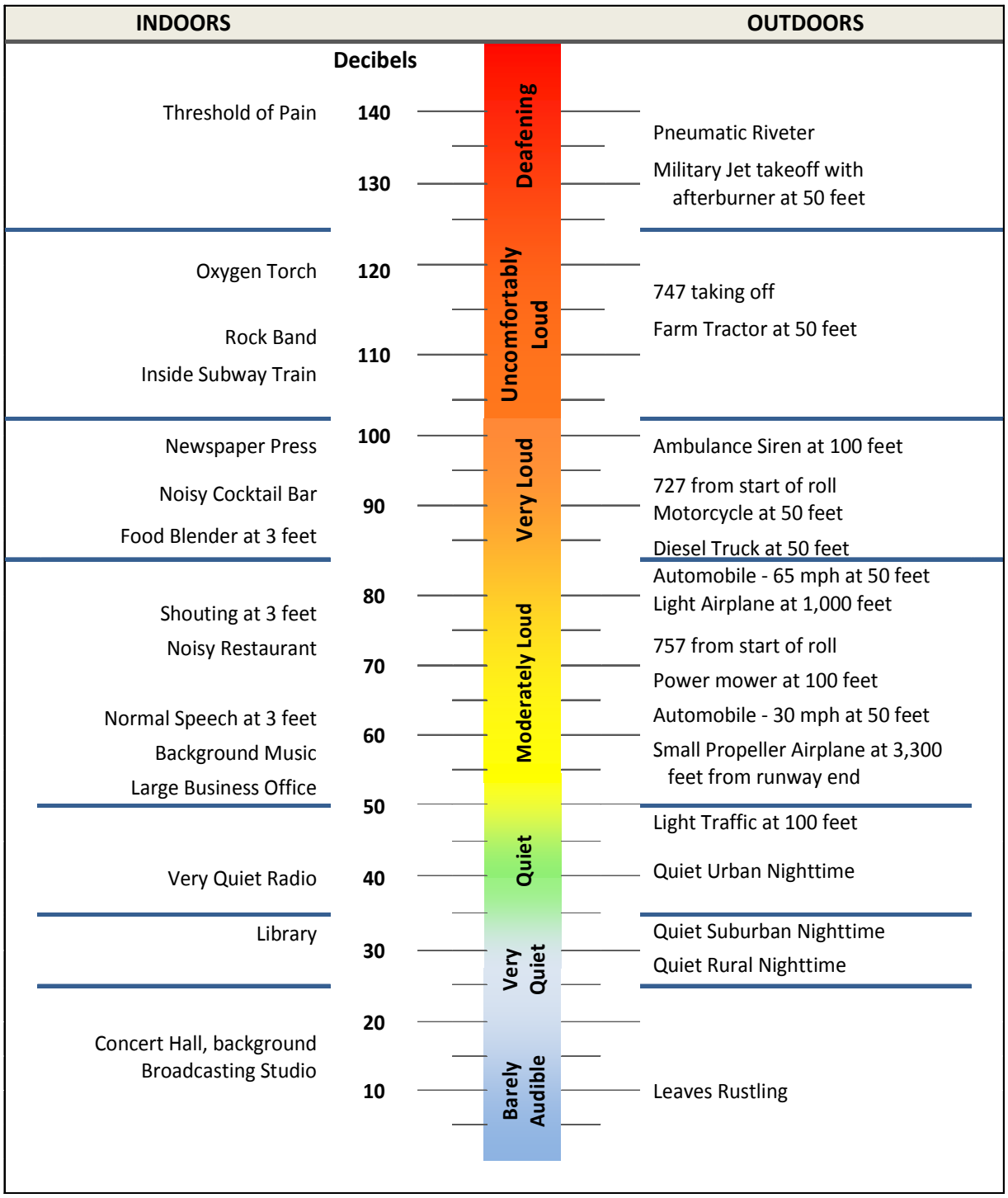


FIGURE 6-1

Approximate Decibel Level of Common Sound Sources

Source: Adapted from CALTRANS Airport Land Use Compatibility Guidebook

Day-Night Average Sound Level (Decibels)	Effects[1]			
	Hearing Loss (Qualitative Description)	Annoyance[2] (Percentage of Population Highly Annoyed)[3]	Average Community Reaction[4]	General Community Attitude Toward Area
>75	May begin to occur	37%	Very severe	Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will not likely occur	22%	Severe	Noise is one of the most important adverse aspects of the community environment.
65	Will not occur	12%	Significant	Noise is one of the important adverse aspects of the community environment.
60	Will not occur	7%	Moderate to Slight	Noise may be considered an adverse aspect of the community environment.
<55	Will not occur	3%		Noise considered no more important than various other environmental factors.

[1] All data is drawn from National Academy of Science 1977 report Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise.

[2] A summary measure of the general adverse reaction of people to living in noisy environments that cause speech interference; sleep disturbance; desire for tranquil environment; and the inability to use the telephone, radio or television satisfactorily.

[3] The percentage of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time. USAF Update with 400 points (Finegold et al. 1992)

[4] Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

NOTE:
Research implicates noise as a factor producing stress-related health effects such as heart disease, high blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however, have not as yet been conclusively demonstrated. (Thompson 1981; Thompson et al. 1989; CHABA 1981; CHABA 1982; Hattis et al. 1980; and U.S. EPA 1981)

Source: Federal Interagency Committee on Noise (1992)

FIGURE 6-2
Summary of Noise Effects

6.2 CONTOURS

Noise contours for Spokane International Airport were generated for three operating scenarios:

- Base Year (2010) Scenario – this includes existing annual operations (79,120) using 2010 data on the existing runway layout. These contours are illustrated in **Figure 6-3**.
- Future (2030) Scenario – this scenario uses annual operations as presented in the Forecast Chapter of this Master Plan for 2030 (120,827) on the existing runway layout. Future (2030) Scenario contours are presented in **Figure 6-4**.
- Ultimate (Capacity) Scenario – this scenario illustrates noise on the ultimate runway configuration, which includes the new runway (3L/21R) plus a 1,000 foot extension to the approach end of Runway 3R. Operations equal the calculated annual service volume capacity with this runway configuration (215,000). The Ultimate Scenario contours are shown in **Figure 6-5**.

The noise contours represent noise exposure over a 24-hour period based on average day conditions at GEG. The weighted DNL metric is used to statistically predict the amount of annoyance that cumulative noise exposure would have on a typical population. Lands outside the Airport property and under the influence of the 60 and 65 dB contours are quantified in **Table 6-1** below.

TABLE 6-1: Acres of Land Affected By Noise – Not Under Airport Control

Scenario	Area Affected	60-65 dB DNL	+65 dB DNL
Base Year (2010)	Area North of Runway 21	167 acres	15 acres
	Area South of Runway 3	191 acres	3 acres
	Total Acres	**358**	**18**
Future (2030) Scenario	Area North of Runway 21	274 acres	38 acres
	Area South of Runway 3	464 acres	33 acres
	Total Acres	**738**	**71**
Ultimate Scenario	Area North of Runway 21R & 21L	680 acres	108 acres
	Area South of Runways 3L & 3R	1,174 acres	113 acres
	Area East of Runway 25	18 acres	—
	Total Acres	**1,872**	**221**

6.2.1 Noise Model Inputs

The Integrated Noise Model (INM) 7.0b was used to generate the DNL noise contours for each scenario. The INM is developed by the FAA and is the standard model for computer analysis of aircraft noise. Detailed operational data is required for input into the INM for the program to generate the contours. This data includes specific aircraft fleet mix and number of operations for each, time of day that aircraft operate, runway use percentages, and the dispersal of flight tracks - the paths aircraft use when approaching or departing a particular runway.

To accurately portray average noise exposure at GEG, aircraft operational data was obtained from multiple sources. These include, but are not limited to: airport management and air traffic control tower staff, the FAA's Enhanced Traffic Management System Counts (ETMSC), apgDat airport data, and previous studies.

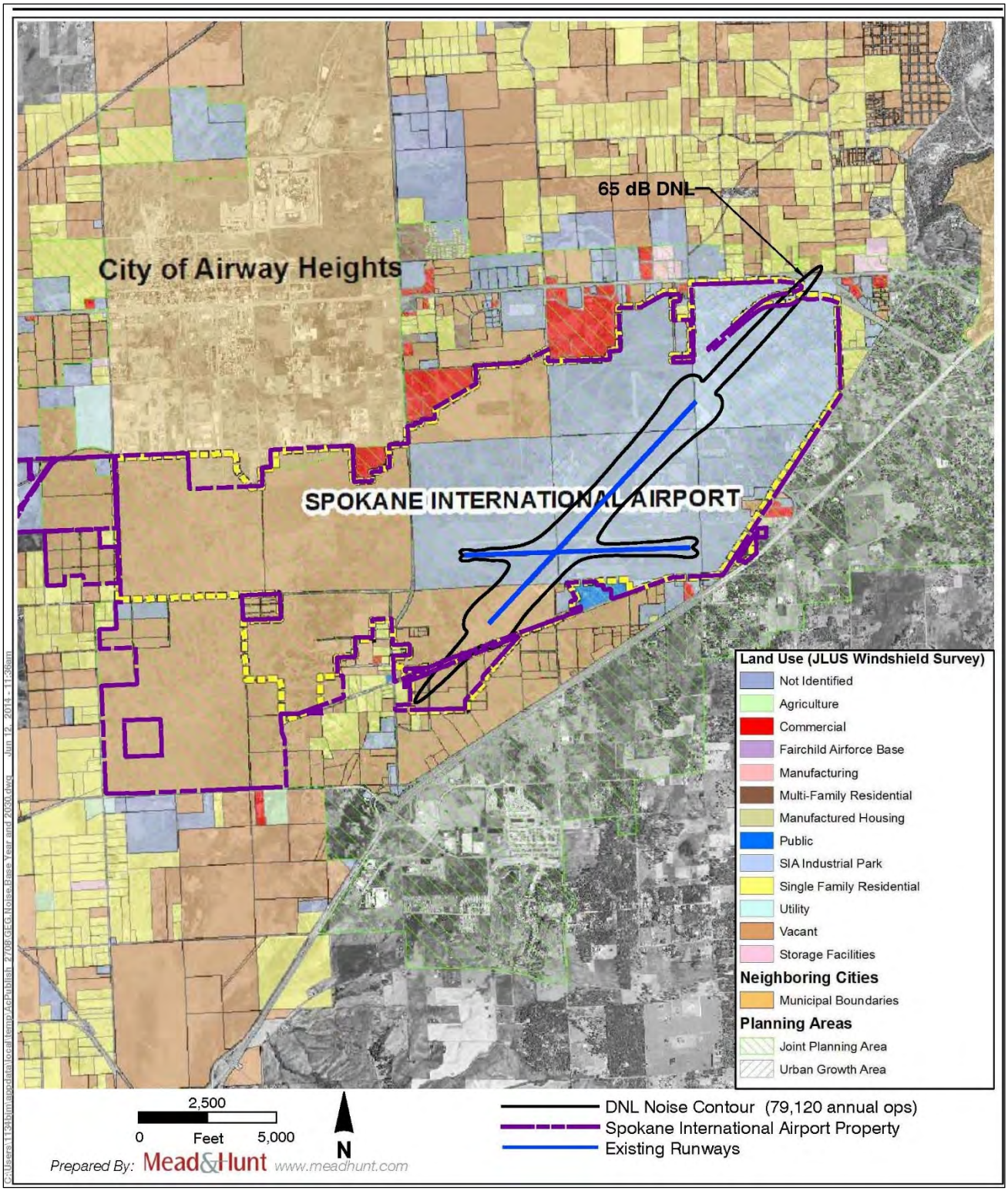


FIGURE 6-3

Base Year (2010) Noise Contours

Spokane International Airport

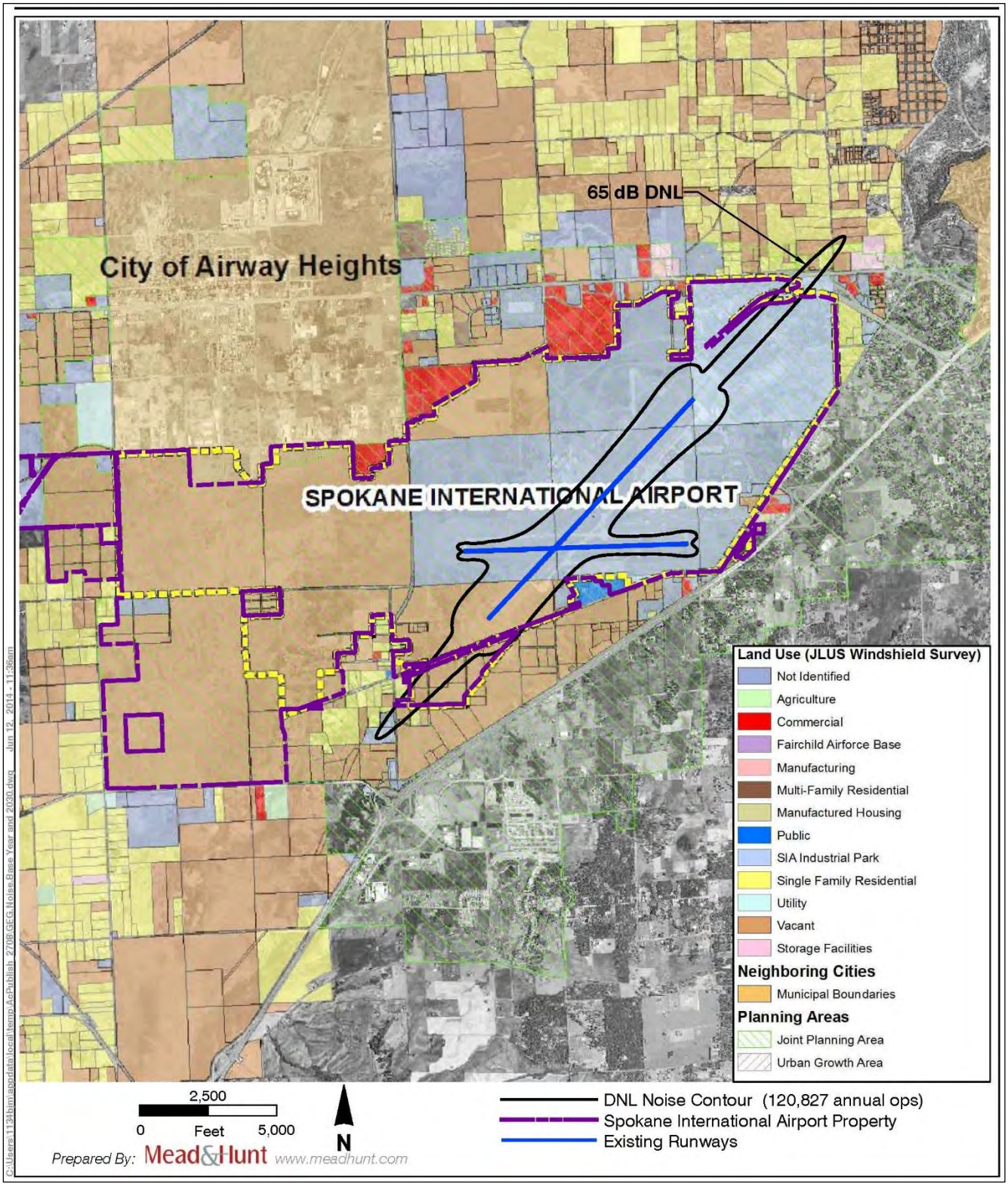


FIGURE 6-4

Future Scenario (2030) Noise Contours

Spokane International Airport

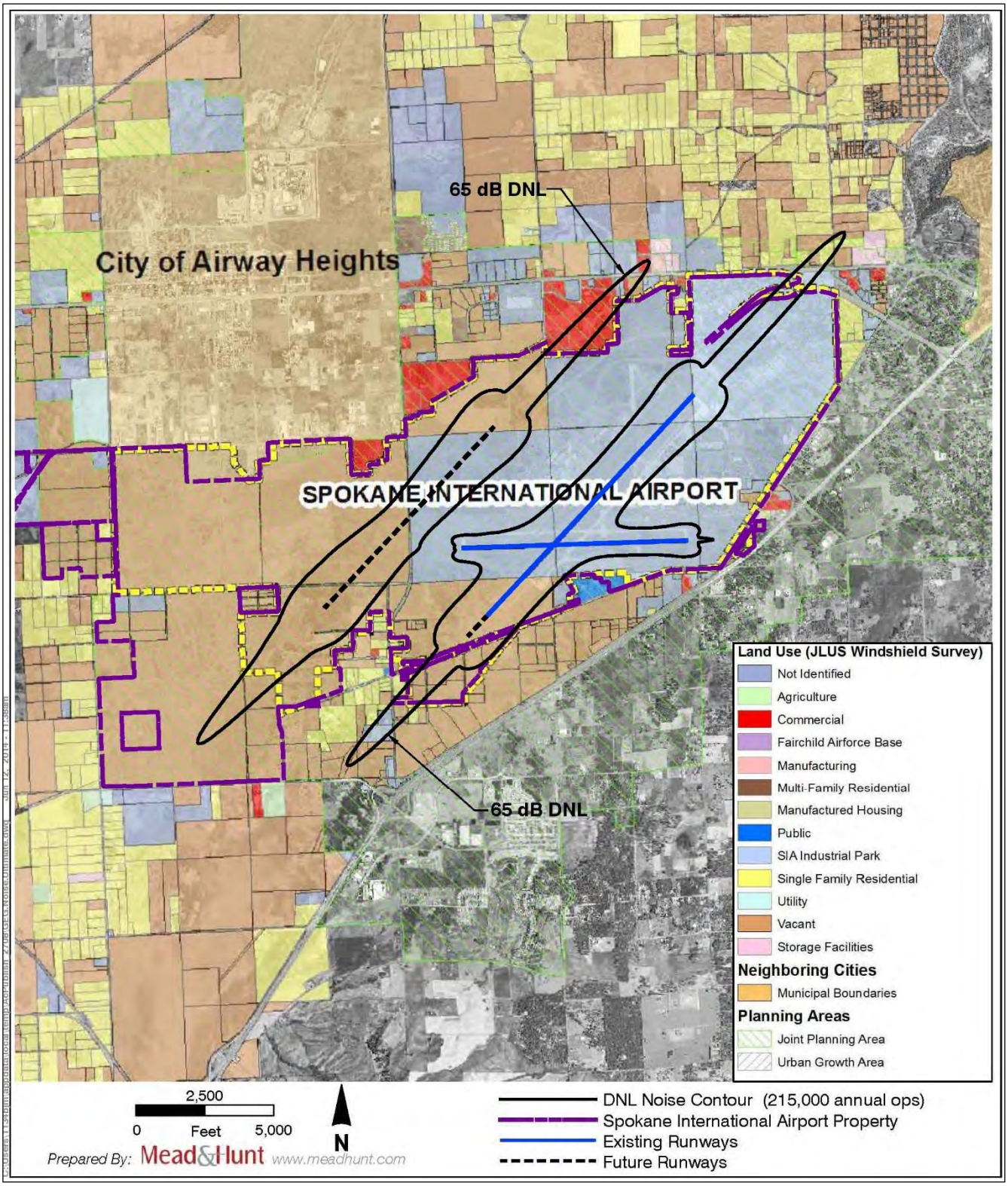


FIGURE 6-5

Ultimate Scenario (Capacity) Noise Contours

Spokane International Airport

6.2.2 Aircraft Operations and Fleet Mix

Base Year Scenario operations were derived from multiple sources. The FAA's Enhanced Traffic Management System Counts (ETMSC), apgDat airport data, and 2010 data from the Forecast Chapter were used to derive a fleet mix and assign operation totals to specific aircraft. Total operations for air carrier, air taxi, general aviation and military aircraft from the Forecast Chapter were retained for each scenario. While Chapter 2 did provide some specific aircraft types, it does not include the detail needed for the INM. ETMSC and apgDat data was used to supplement what is presented in the Forecast Chapter and formulate a reasonable fleet mix.

The ETMSC data includes specific aircraft counts for itinerant aircraft that file flight plans. However, the ETMSC also contains lapses in data and does not include local operations. The apgDat data provided specific aircraft types for scheduled passenger aircraft for March and July 2011, but only includes scheduled operations. A fleet mix for the Base Year Scenario was derived using the sources above. Assumptions were made on some specific aircraft types, supported by conversations with airport and tower staff. The fleet mix with annual operations by type is provided in **Table 6-2**.

Future (2030) Scenario operation totals are based on the totals presented in the Forecast Chapter for 2030. Figures for air carrier, air taxi, cargo, general aviation, and military aircraft match what is in Chapter 2. Specific aircraft types for 2030 are given for air carrier and cargo operations and these were used in this Scenario. Other specific aircraft types for air taxi and general aviation were derived from the ETMSC data for 2010. Future (2030) operation totals are presented in **Table 6-3**.

Ultimate Scenario operation figures are based on the annual service volume capacity of the Airport of 215,000 operations. Air carrier, cargo, air taxi and general aviation operations for this scenario are proportionately the same as the Future Scenario. For instance, air carrier operations are about 60% of total operations in the Future scenario. This percentage remains constant in the Ultimate Scenario. Some additional aircraft were added to the Ultimate Scenario which represent aircraft using the airport for maintenance, repair or overhaul facilities as proposed in the Alternative section, and are discussed below. Aircraft totals for the Ultimate Scenario are documented in **Table 6-4**.

6.2.3 Aircraft Substitutions

A limitation of the INM is that only certain aircraft are programmed into its database. Since aircraft of similar make produce similar noise levels, the INM provides a substitution list for aircraft that are not included. The specific types of aircraft used in each Scenario are detailed under the INM Aircraft Type heading in Tables 6-2 through 6-4.

An important part of this study was to carefully select the types of aircraft INM offers for modeling purposes for this study. Common substitution aircraft for single-engine, multi-engine, turboprops and jets used for this study are shown in **Table 6-5**. For example, the GV INM aircraft type represents the Gulfstream V. This aircraft is also a substitution aircraft for the Bombardier CRJ 700 and CRJ 900 which are scheduled passenger aircraft that operate at GEG. Therefore, the operation total for the GV includes operations by the CRJ 700 and CRJ 900.

TABLE 6-2: Base Year (2010) Scenario Operations

Commercial Aircraft Group

INM Aircraft Type	Operations			Daytime Departures		Daytime Arrivals		
	Annual	% of Total	Daily Average	Scheduled Air Carrier	Other	Scheduled Air Carrier	Cargo	Other
A300 – 622R	652	1.0%	1.8	n/a	99/1%	n/a	0%	99/1%
A310-304	1,698	2.5%	4.7	n/a	99/1%	n/a	50/50%	99/1%
A319-131	3,536	5.2%	9.7	80/20%	99/1%	80/20%	n/a	99/1%
A320-211	2,756	4.0%	7.6	50/50%	99/1%	75/25%	n/a	99/1%
727EM2	50	0.1%	0.1	n/a	99/1%	n/a	n/a	99/1%
737300	6,136	9.0%	16.8	88/12%	99/1%	88/12%	n/a	99/1%
737400	2,080	3.0%	5.7	100/0%	99/1%	35/65%	n/a	99/1%
737500	104	0.2%	0.3	100/0%	99/1%	100/0%	n/a	99/1%
737700	4,730	6.9%	13.0	87/13%	99/1%	83/17%	n/a	99/1%
737800	200	0.3%	0.5	n/a	99/1%	n/a	n/a	99/1%
757300	1,484	2.2%	4.1	100/0%	99/1%	100/0%	25/75%	99/1%
767300	442	0.6%	1.2	n/a	99/1%	n/a	0%	99/1%
CRJ9-ER	2,300	3.4%	6.3	100/0%	99/1%	76/24%	n/a	99/1%
CL601	3,860	5.7%	10.6	75/25%	99/1%	75/25%	n/a	99/1%
DO328	12,688	18.6%	34.8	85/15%	99/1%	92/8%	n/a	99/1%
MD9025	500	0.7%	1.4	n/a	99/1%	n/a	n/a	99/1%

Business Jet/Turboprop Group

INM Aircraft Type	Operations			Daytime Departures		Daytime Arrivals		
	Annual	% of Total	Daily Average	Scheduled Air Carrier	Other	Scheduled Air Carrier	Cargo	Other
1900D	100	0.1%	0.3	n/a	99/1%	n/a	n/a	99/1%
CIT3	313	0.5%	0.9	n/a	99/1%	n/a	n/a	99/1%
CNA208	5,907	8.7%	16.2	n/a	99/1%	n/a	50/50%	99/1%
CNA441	567	0.8%	1.6	n/a	99/1%	n/a	n/a	99/1%
CNA500	383	0.6%	1.0	n/a	99/1%	n/a	n/a	99/1%
CNA55B	187	0.3%	0.5	n/a	99/1%	n/a	n/a	99/1%
CNA750	109	0.2%	0.3	n/a	99/1%	n/a	n/a	99/1%
DHC6	1,500	2.2%	4.1	n/a	99/1%	n/a	n/a	99/1%
DHC8	454	0.7%	1.2	n/a	99/1%	n/a	50/50%	99/1%
EMB120	1,472	2.2%	4.0	n/a	99/1%	n/a	n/a	99/1%
GII	32	<0.1%	0.1	n/a	99/1%	n/a	n/a	99/1%
GIIB	14	<0.1%	0.0	n/a	99/1%	n/a	n/a	99/1%
GIV	82	0.1%	0.2	n/a	99/1%	n/a	n/a	99/1%
GV	1,036	1.5%	2.8	90/10%	99/1%	95/5%	n/a	99/1%
HS748A	318	0.5%	0.9	n/a	99/1%	n/a	n/a	99/1%
IA1125	19	<0.1%	0.1	n/a	99/1%	n/a	n/a	99/1%
LEAR35	1,145	1.7%	3.1	n/a	99/1%	n/a	n/a	99/1%
MU3001	503	0.7%	1.4	n/a	99/1%	n/a	n/a	99/1%
PA31	1,349	2.0%	3.7	n/a	99/1%	n/a	n/a	99/1%

General Aviation – Propeller Group

INM Aircraft Type	Total Operations		Itinerant Operations		Daytime Departures	Daytime Arrivals		Local Operations	
	Annual	% of Total	Annual	Daily Average	All	Cargo	Other	Annual	Daily Average
BEC58P	6,239	4.3%	2,959	8.1	99/1%	50%	99/1%	3,280	9.0
CNA172	4,250	2.2%	1,500	4.1	99/1%	n/a	99/1%	2,750	7.5
CNA206	4,250	2.2%	1,500	4.1	99/1%	n/a	99/1%	2,750	7.5
GASEPV	4,057	2.9%	2,000	5.5	99/1%	n/a	99/1%	2,057	5.6

Military Group

INM Aircraft Type	Operations			Day/Nighttime Departures	Day/Nighttime Arrivals
	Annual	% of Total	Daily Average		
KC135R	1,294	0.6%	3.5	99/1%	99/1%
P3C	162	0.1%	0.4	99/1%	99/1%
C130	81	<0.1%	0.2	99/1%	99/1%
UH1	81	<0.1%	0.2	99/1%	99/1%

Note: Military Group operations remain constant in each Scenario

TABLE 6-3: Future (2030) Scenario Operations

Commercial Aircraft Group

INM Aircraft Type	Operations			Day/Nighttime Departures		Day/Nighttime Arrivals		
	Annual	% of Total	Daily Average	Scheduled Air Carrier	Other	Scheduled Air Carrier	Cargo	Other
A300 – 622R	981	0.8%	2.7	n/a	99/1%	n/a	0%	99/1%
A310-304	2,555	2.1%	7.0	n/a	99/1%	n/a	50/50%	99/1%
A319-131	1,645	1.4%	4.5	83/17%	99/1%	86/14%	n/a	99/1%
A320-211	14,588	12.1%	40.0	83/17%	99/1%	86/14%	n/a	99/1%
717200	1,520	1.3%	4.2	83/17%	99/1%	86/14%	n/a	99/1%
737300	200	0.0%	0.5	n/a	99/1%	n/a	n/a	99/1%
737400	200	0.2%	0.5	n/a	99/1%	n/a	n/a	99/1%
737500	14,588	0.2%	40.0	83/17%	99/1%	86/14%	n/a	99/1%
737700	1,785	12.1%	4.9	83/17%	99/1%	86/14%	n/a	99/1%
737800	1,785	1.5%	4.9	83/17%	99/1%	86/14%	n/a	99/1%
757300	1,927	1.5%	5.3	83/17%	99/1%	86/14%	25/75%	99/1%
767300	514	1.6%	1.4	n/a	99/1%	n/a	0%	99/1%
CRJ9-ER	14,299	0.4%	39.2	83/17%	99/1%	86/14%	n/a	99/1%
CL601	903	11.8%	2.5	83/17%	99/1%	86/14%	n/a	99/1%
DO328	452	0.7%	1.2	83/17%	99/1%	86/14%	n/a	99/1%
EMB145	1,355	0.4%	3.7	83/17%	99/1%	86/14%	n/a	99/1%

Business Jet/Turboprop Group

INM Aircraft Type	Operations			Day/Nighttime Departures		Day/Nighttime Arrivals		
	Annual	% of Total	Daily Average	Scheduled Air Carrier	Other	Scheduled Air Carrier	Cargo	Other
1900D	451	0.4%	1.2	83/17%	99/1%	86/14%	n/a	99/1%
CIT3	500	0.4%	1.4	n/a	99/1%	n/a	n/a	99/1%
CNA208	8,887	7.4%	24.3	n/a	99/1%	n/a	50/50%	99/1%
CNA441	500	0.4%	1.4	n/a	99/1%	n/a	n/a	99/1%
CNA500	500	0.4%	1.4	n/a	99/1%	n/a	n/a	99/1%
CNA55B	500	0.4%	1.4	n/a	99/1%	n/a	n/a	99/1%
CNA750	500	0.4%	1.4	n/a	99/1%	n/a	n/a	99/1%
DHC6	1,750	1.4%	4.8	n/a	99/1%	n/a	n/a	99/1%
DHC8	682	0.6%	1.9	n/a	99/1%	n/a	50/50%	99/1%
EMB120	751	0.6%	2.1	83/17%	99/1%	86/14%	n/a	99/1%
GII	50	0.0%	0.1	n/a	99/1%	n/a	n/a	99/1%
GIV	291	0.2%	0.8	n/a	99/1%	n/a	n/a	99/1%
GV	17,438	14.4%	47.8	83/17%	99/1%	86/14%	n/a	99/1%
IA1125	100	0.1%	0.3	n/a	99/1%	n/a	n/a	99/1%
LEAR35	1,500	1.2%	4.1	n/a	99/1%	n/a	n/a	99/1%
MU3001	600	0.5%	1.6	n/a	99/1%	n/a	n/a	99/1%
PA31	1,600	1.3%	4.4	n/a	99/1%	n/a	n/a	99/1%

General Aviation – Propeller Group

INM Aircraft Type	Total Operations		Itinerant Operations		Day/Nighttime Departures	Day/Nighttime Arrivals		Local Operations	
	Annual	% of Total	Annual	Daily Average	All	Cargo	Other	Annual	Daily Average
BEC58P	6,307	5.2%	3,691	10.1	99/1%	50/50%	99/1%	2,616	7.2
CNA172	7,005	5.8%	2,000	5.5	99/1%	n/a	99/1%	5,005	13.7
CNA206	5,000	4.1%	2,000	5.5	99/1%	n/a	99/1%	3,000	8.2
GASEPV	5,000	4.1%	2,000	5.5	99/1%	n/a	99/1%	3,000	8.2

Note: Military Group operations remain constant from Base Year Scenario

TABLE 6-4: Ultimate Scenario Operations

Commercial Aircraft Group

INM Aircraft Type	Operations			Day/Nighttime Departures		Day/Nighttime Arrivals		
	Annual	% of Total	Daily Average	Scheduled Air Carrier	Other	Scheduled Air Carrier	Cargo	Other
A300-622R	2,600	1.2%	7.1	n/a	99/1%	n/a	0%	99/1%
A310-304	7,100	3.3%	19.5	n/a	99/1%	n/a	50/50%	99/1%
A319-131	2,686	1.2%	7.4	83/17%	99/1%	86/14%	n/a	99/1%
A320-211	26,212	12.2%	71.8	83/17%	99/1%	86/14%	n/a	99/1%
A340-642	200	0.1%	0.5	n/a	99/1%	n/a	n/a	99/1%
717200	2,686	1.2%	7.4	83/17%	99/1%	86/14%	n/a	99/1%
727EM2	100	<0.1%	0.3	n/a	99/1%	n/a	n/a	99/1%
737300	100	<0.1%	0.3	n/a	99/1%	n/a	n/a	99/1%
737400	100	<0.1%	0.3	n/a	99/1%	n/a	n/a	99/1%
737500	26,212	12.2%	71.8	83/17%	99/1%	86/14%	n/a	99/1%
737700	3,116	1.4%	8.5	83/17%	99/1%	86/14%	n/a	99/1%
737800	3,232	1.5%	8.9	83/17%	99/1%	86/14%	n/a	99/1%
747400	200	0.1%	0.5	n/a	99/1%	n/a	n/a	99/1%
757300	3,116	1.4%	8.5	83/17%	99/1%	86/14%	n/a	99/1%
757PW	600	0.3%	1.6	n/a	99/1%	n/a	25/75%	99/1%
767300	2,200	1.0%	6.0	n/a	99/1%	n/a	0%	99/1%
767400	200	0.1%	0.5	n/a	99/1%	n/a	n/a	99/1%
777200	200	0.1%	0.5	n/a	99/1%	n/a	n/a	99/1%
777300	200	0.1%	0.5	n/a	99/1%	n/a	n/a	99/1%
CRJ9-ER	25,595	11.9%	70.1	83/17%	99/1%	86/14%	n/a	99/1%
CL601	1,616	0.8%	4.4	83/17%	99/1%	86/14%	n/a	99/1%
DO328	809	0.4%	2.2	83/17%	99/1%	86/14%	n/a	99/1%
EMB145	2,425	1.1%	6.6	83/17%	99/1%	86/14%	n/a	99/1%

Business Jet/Turboprop Group

INM Aircraft Type	Operations			Day/Nighttime Departures		Day/Nighttime Arrivals		
	Annual	% of Total	Daily Average	Scheduled Air Carrier	Other	Scheduled Air Carrier	Cargo	Other
1900D	807	0.4%	2.2	83/14%	99/1%	86/14%	n/a	99/1%
CIT3	895	0.4%	2.5	n/a	99/1%	n/a	n/a	99/1%
CNA208	12,000	5.6%	32.9	n/a	99/1%	n/a	50/50 %	99/1%
CNA441	895	0.4%	2.5	n/a	99/1%	n/a	n/a	99/1%
CNA500	895	0.4%	2.5	n/a	99/1%	n/a	n/a	99/1%
CNA55B	895	0.4%	2.5	n/a	99/1%	n/a	n/a	99/1%
CNA750	895	0.4%	2.5	n/a	99/1%	n/a	n/a	99/1%
DHC6	3,132	1.5%	8.6	n/a	99/1%	n/a	n/a	99/1%
EMB120	1,345	0.6%	3.7	83/14%	99/1%	86/14%	n/a	99/1%
GIV	521	0.2%	1.4	n/a	99/1%	n/a	n/a	99/1%
GV	31,302	14.6%	85.8	83/14%	99/1%	86/14%	n/a	99/1%
IA1125	179	0.1%	0.5	n/a	99/1%	n/a	n/a	99/1%
LEAR35	2,685	1.2%	7.4	n/a	99/1%	n/a	n/a	99/1%
MU3001	1,074	0.5%	2.9	n/a	99/1%	n/a	n/a	99/1%
PA31	2,864	1.3%	7.8	n/a	99/1%	n/a	n/a	99/1%

General Aviation – Propeller Group

INM Aircraft Type	Total Operations		Itinerant Operations		Day/Nighttime Departures	Day/Nighttime Arrivals		Local Operations	
	Annual	% of Total	Annual	Daily Average	All	Cargo	Other	Annual	Daily Average
BEC58P	11,053	5.1%	5,370	30.3	99/1%	50%	99/1%	4,683	12.8
CNA172	12,539	5.8%	3,580	34.4	99/1%	n/a	99/1%	8,959	24.5
CNA206	8,950	4.2%	3,580	24.5	99/1%	n/a	99/1%	5,370	14.7
GASEPV	8,950	4.2%	3,580	24.5	99/1%	n/a	99/1%	5,370	14.7

Note: Military Group operations remain constant from Base Year Scenario

TABLE 6-5. Common General Aviation Aircraft Substitutions in INM

Aircraft Type	Substitution Aircraft	Aircraft represented by Substitute aircraft
Single-Engine	Cessna 172	Cessna 150, 152, 170, 172
	Cessna 206	Cessna 180, 182, 185, 206, 210
	GA, Pitch Variable	Beech 33, 35 Bonanza; Piper 24, 28, 32, 46; Mooney M20 Series
	GA, Pitch Fixed	Cessna 140, 208, Columbia 400; Cirrus SR22; Pilatus PC12
Twins and Turboprops	Cessna 441	King Air C90; Cessna 441; Cheyenne 31,42; Merlin II, III
	Beech Baron 58	Beech Baron 55, 58; Cessna 300 and 400 Series; Piper 34, 44
	DeHavilland Dash 6	Beechcraft Super King Air Series 200-350; Swearingen Merlin IV
Business Jet	Learjet 35	Lear Jet Series 35-60; Falcon 10, 200
	Bombardier CL 601	CL-601; Falcon 900, Falcon 2000
	Mitsubishi MU-300	Beechjet 400; Citation II, V
	Cessna Citation 550	Citation I, Citation Jet
	Cessna Citation X	Citation X
	Gulfstream IV	Gulfstream 300 and 400 Series
	Gulfstream V	Embraer 170, 190, CRJ 701 and 901

No substitution aircraft exist in the INM for military and helicopter aircraft.

Mooney M20

Cessna 206

Cirrus SR22

Beechcraft Super King Air

Citation Jet

Citation X

There is uncertainty regarding forecasting which aircraft types will be operating in the long-term. The INM database includes existing aircraft and estimating what will be in service in 30 years relies on using the best information available at this time. Assumptions made for the Future and Ultimate Scenario's fleet mixes are disclosed below.

Aircraft types modeled in the Ultimate Scenario that are not in the Base Year and Future Scenarios include the A340, 747-400, 777-200 and 777-300. These aircraft were added with the assumption that maintenance, repair and overhaul business will increase at the Airport, as described in the Airside Facilities Chapter.

6.2.4 Aircraft Groups

To help simplify data input into the INM, aircraft were placed into four groups: Commercial, Business Jet/Turboprop, General Aviation – Propeller, and Military. Aircraft in the same group are distributed similarly over each flight track (see Flight Tracks information and tables below).

The groups should not be confused with air carrier, cargo, and air taxi. The aircraft used for air carrier, cargo, and air taxi are primarily in the commercial group. Some exceptions include the GV which represents some air carrier activity but is in the Business jet/turboprop group and the CNA208 and DHC8 which represent some cargo activity.

6.2.5 Day/Night Split

The DNL metric 'penalizes' aircraft activity that occurs after 10:00 PM and before 7:00 AM by applying a 10 dB penalty for each operation. Therefore it is important to obtain accurate night data and separate these operations from those that occur during the day. Arrival and departure percentages for daytime operations are included in Tables 2 through 4.

For the Base Year Scenario, scheduled arrival and departure times for air carrier aircraft were provided in the apgDat report. The data allow aircraft types to be modeled with accurate day and night percentages. It was assumed that 99 percent of other aircraft operations occur during daytime hours. This number was used in previous noise studies and was confirmed by tower staff.

For air carrier operations in the Future and Ultimate scenarios, an average of all air carrier arrivals and departures was calculated from the 2010 apgDat data. This was done because at the time of this analysis, it is unknown which aircraft will be operating at specific times in these scenarios. Time of Day splits for cargo and other operations for the Future and Ultimate scenarios remain the same as the Base Year Scenario.

6.2.6 Flight Tracks

Aircraft arriving and departing GEG normally follow similar flight paths, or tracks. The tracks are not finite but over the course of time an average position of the tracks can be observed. Different aircraft will use different tracks based on various factors. The size of the aircraft may determine how soon after departure (or prior to arrival) that aircraft deviate from runway heading. Larger aircraft require more time to climb (and descend) and will usually turn at points farther from the runway end. The origin or destination of the aircraft also helps determine which way aircraft travel to and from the runway. During instrument flight rules conditions, aircraft may be directed by air traffic control on different routes that same aircraft would take during visual flight rules conditions.

Radar data acquired from the control tower along with conversations with tower staff helped establish the location of average flight tracks. The flight tracks modeled are illustrated in **Figure 6-6** for existing Runway 3-21, **Figure 6-7** for Runway 7-25 and **Figure 6.-8** for the ultimate Runway 3L/21R. The percentage splits on each flight track for the aircraft groups are documented in **Table 6-6** for the Base Year and Future Scenarios and in **Table 6-7** for the Ultimate Scenario.

The locations of the flight tracks were based on multiple sources. The radar data acquired represented one day's worth of activity at GEG. While this proved helpful in establishing the tracks, most aircraft activity that day was on Runway 3-21. This left little data to establish tracks on Runway 7-25. To help establish the locations, flight tracks from previous studies were used. The tracks from previous studies were confirmed by control tower staff to be accurate.

Most of the preexisting tracks made turns that were close to the runway ends, which is typical of how smaller aircraft operate. These arrival tracks were named 'visual' in the tables. When observing the radar data, the larger aircraft will start turns farther from the runways, and make wider turns. Additional arrival tracks were created that better represent where larger aircraft travel, and are named "RNP" in the tables.

The RNP (Required Navigation Performance) tracks that were used for larger aircraft are based upon new instrument approaches that mimic visual approaches for large aircraft under IFR conditions. These procedures are new and only being used by select commercial operators; however, their adoption is becoming more wide-spread over time.

Large air carrier, cargo, and military aircraft were modeled to fly on the RNP tracks and make turns further from the runway ends. Business jet operations were also primarily modeled on RNP tracks however some were modeled on the visual tracks. The majority of operations by smaller aircraft such as turboprops and piston aircraft were modeled on the visual flight tracks and a minor amount of operations on the RNP tracks.

Flight tracks modeled for Runway 3R/21L under the Ultimate Scenario are similar to those modeled for Runway 3/21 in the Base Year and Future Scenarios. It was assumed that similar RNP and visual approach and departure procedures would be followed. An extension to Runway 3R in the Ultimate Scenario would cause the flight tracks associated with this runway to shift with the relocated threshold. Flight tracks and associated utilization percentages were developed in coordination with the Spokane airport traffic control tower.

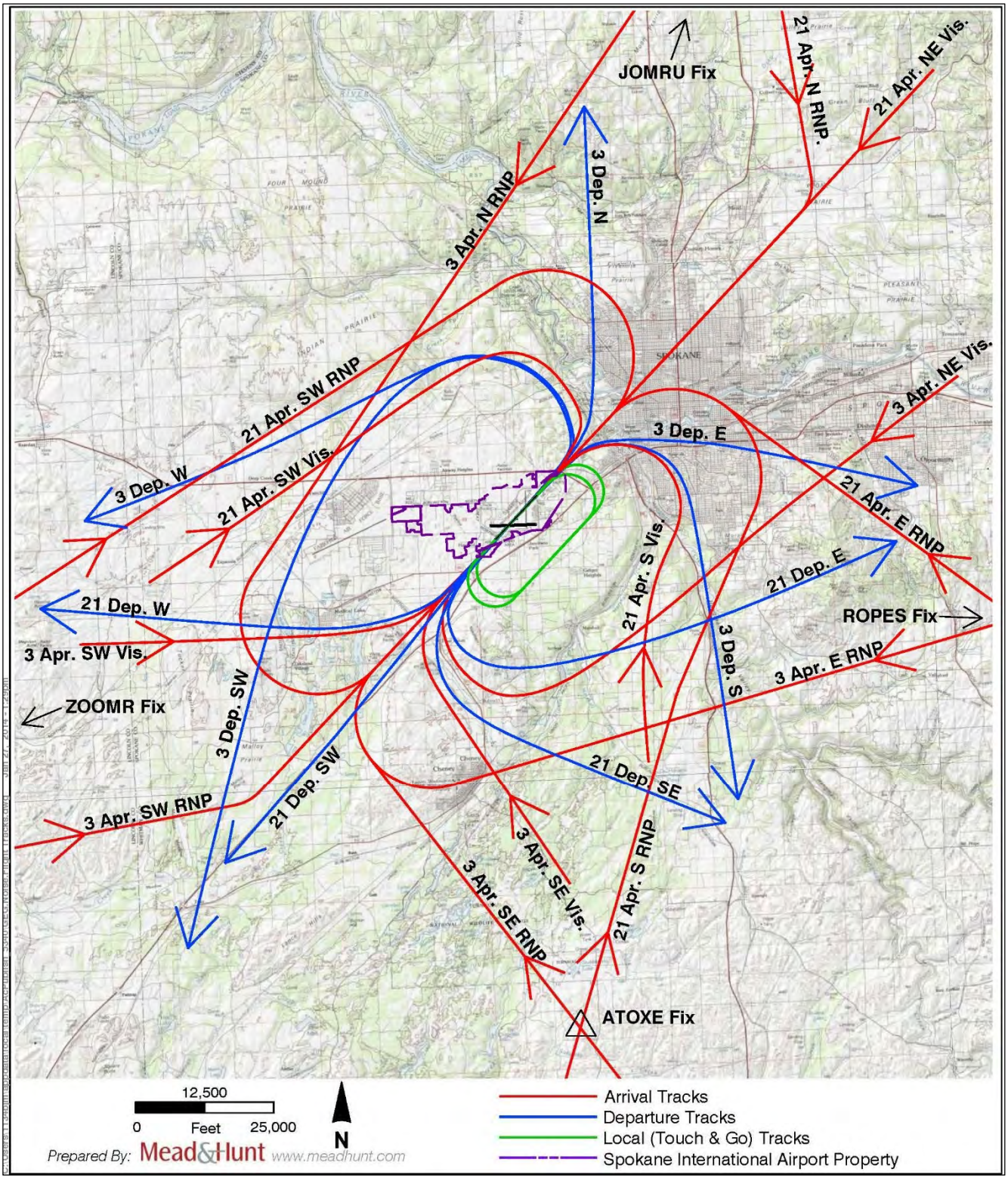


FIGURE 6-6

Runway 3/21 Flight Tracks

Spokane International Airport

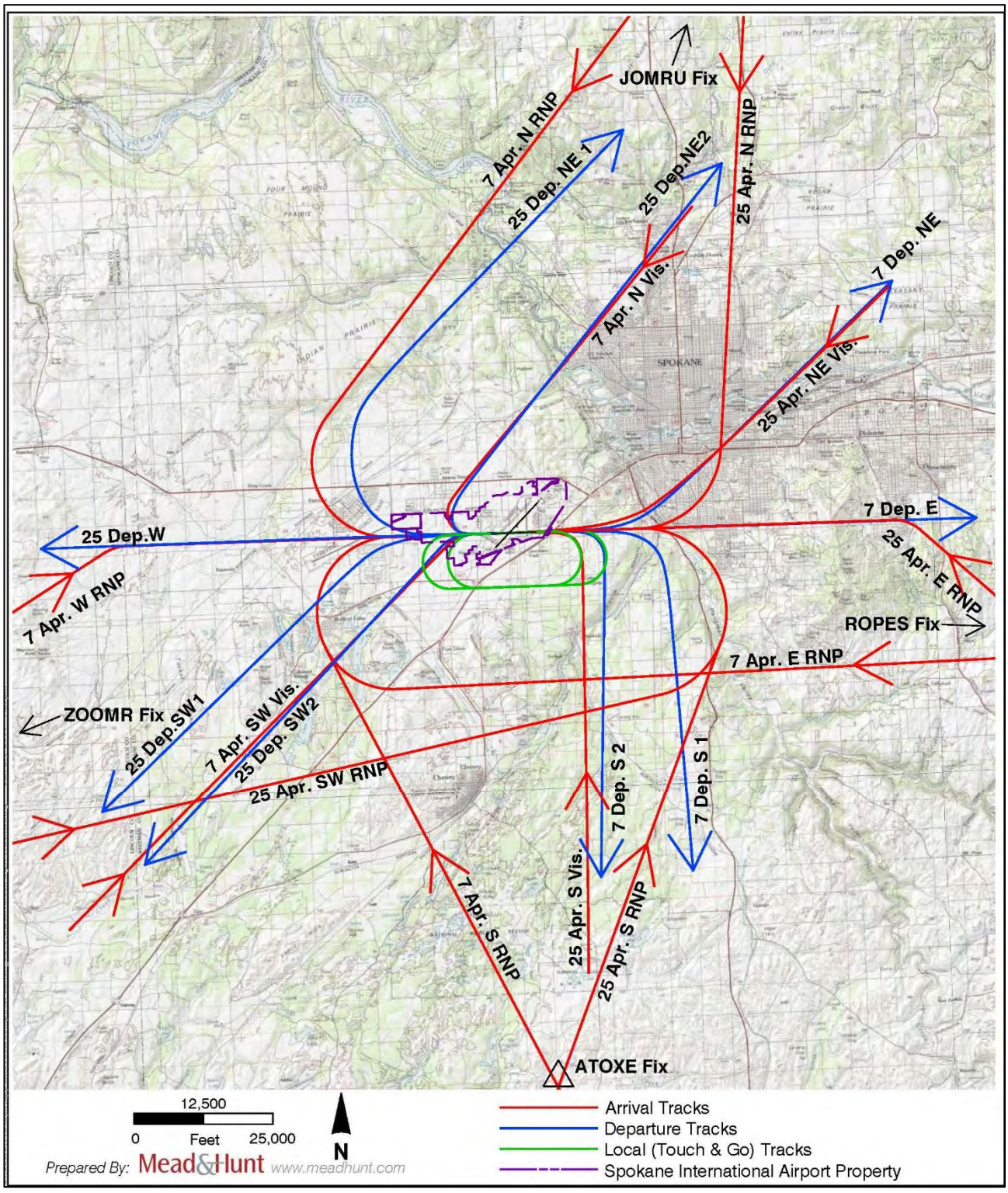


FIGURE 6-7

Runway 7/25 Flight Tracks

Spokane International Airport

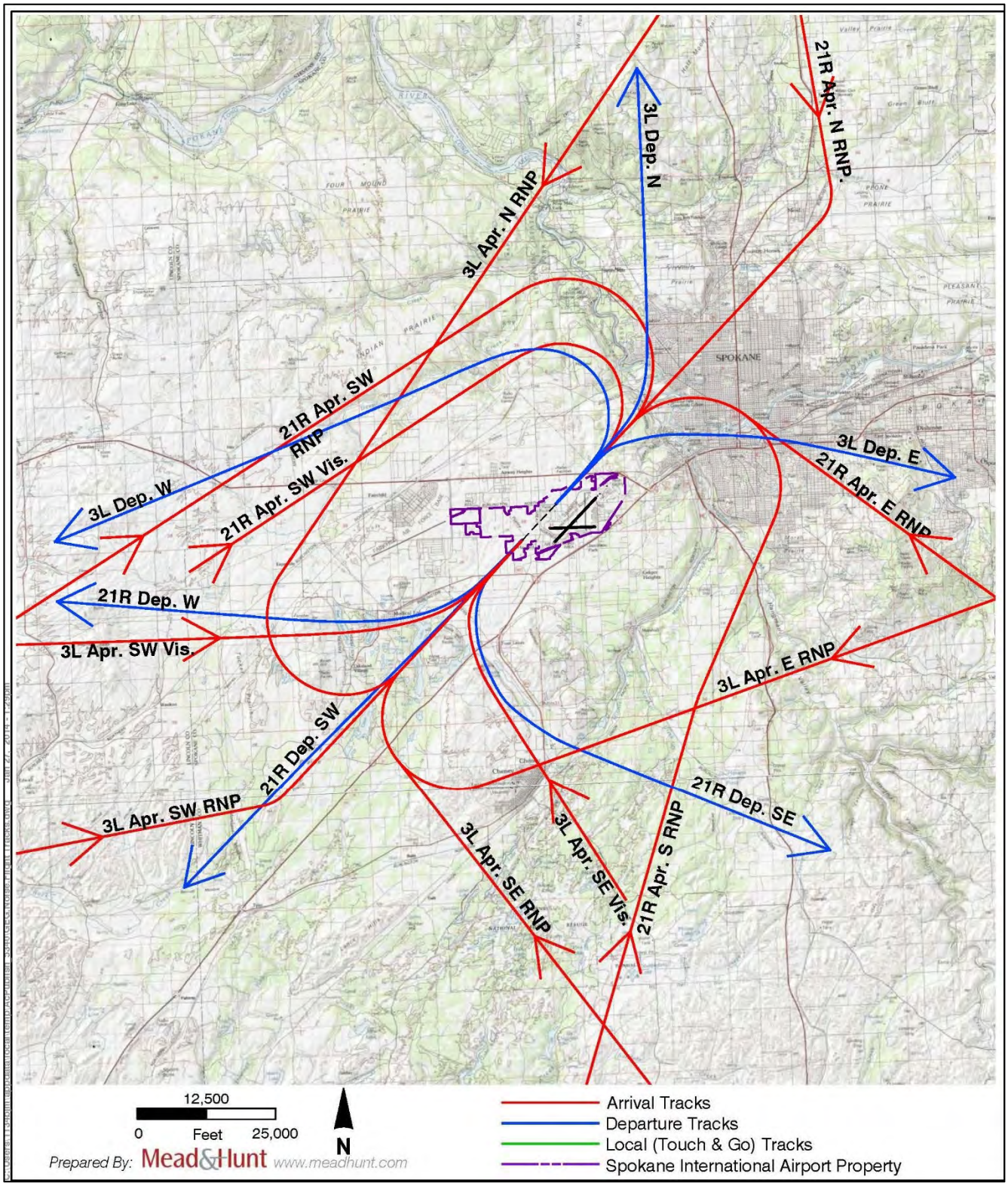


FIGURE 6-8

Ultimate Runway 3L/21R Flight Tracks

Spokane International Airport

TABLE 6-6: Flight Tracks – Base Year and Future Scenarios

ARRIVALS

Runway	Flight Track	Aircraft Group			
		Commercial	Business Jet/Turboprop	General Aviation Propeller	Military
3	North RNP	9.6%	6.4%	1.8%	9.9%
	Southwest RNP	9.6%	6.4%	1.8%	9.9%
	Southeast RNP	5.2%	2.6%	1.0%	5.4%
	East RNP	10.5%	5.2%	2.0%	10.8%
	Southwest Visual	—	6.4%	10.7%	—
	Southeast Visual	—	2.6%	2.9%	—
	Northeast Visual	—	5.2%	5.9%	—
21	North RNP	18.0%	9.0%	6.6%	18.0%
	Southwest RNP	33.0%	16.5%	6.0%	33.0%
	South RNP	4.5%	3.0%	0.8%	4.5%
	East RNP	4.5%	3.0%	0.8%	4.5%
	Northeast Visual	—	9.0%	6.6%	—
	Southwest Visual	—	16.5%	18.1%	—
	South Visual	—	3.0%	5.0%	—
7	North RNP	0.2%	0.1%	0.3%	0.2%
	West RNP	0.2%	0.2%	1.2%	0.2%
	South RNP	0.3%	0.2%	0.5%	0.3%
	East RNP	0.3%	0.2%	0.5%	0.3%
	North Visual	—	0.1%	0.9%	—
	Southwest Visual	—	0.2%	2.7%	—
25	North RNP	0.8%	0.4%	1.2%	0.6%
	Southwest RNP	1.2%	0.8%	1.8%	0.9%
	South RNP	1.2%	0.8%	1.8%	0.9%
	East RNP	0.8%	0.8%	4.8%	0.6%
	Northeast Visual	—	0.4%	3.6%	—
	South Visual	—	0.8%	10.8%	—

Runway 7-25 arrival flight track percentage splits remain constant in the Ultimate Scenario

DEPARTURES

Runway	Flight Track	Aircraft Group			
		Commercial	Business Jet/Turboprop	General Aviation Propeller	Military
3	East	3.2%	3.1%	2.3%	3.2%
	North	0.4%	0.3%	0.3%	0.4%
	South	5.2%	5.3%	3.9%	5.4%
	West	19.3%	19.3%	14.3%	19.8%
	Southwest	7.0%	7.0%	5.2%	7.2%
21	East	6.0%	6.0%	4.4%	6.0%
	Southeast	9.0%	9.0%	6.6%	9.0%
	West	33.0%	33.0%	24.2%	33.0%
	Southwest	12.0%	12.0%	8.8%	12.0%
7	East	0.2%	0.2%	1.2%	0.2%
	Northeast	0.2%	0.2%	1.2%	0.2%
	South 1	0.6%	0.6%	—	0.6%
	South 2	—	—	3.6%	—
25	Northeast 1	0.8%	0.8%	—	0.6%
	Northeast 2	—	—	4.8%	—
	West	0.8%	0.8%	4.8%	0.6%
	Southwest 1	2.4%	2.4%	—	1.8%
	Southwest 2	—	—	14.4%	—

Runway 7-25 departure flight track percentage splits remain constant in the Ultimate Scenario

Note: Tables show percent of all operations per each track. Totals developed in coordination with the Spokane Airport Traffic Control Tower

TABLE 6-7: Flight Tracks – Ultimate Scenario

ARRIVALS

Runway		Flight Track	Aircraft Group			
			Commercial	Business Jet/Turboprop	General Aviation-Propeller	Military
Existing Runway	3R	North RNP	4.8%	3.2%	0.9%	4.9%
		Southwest RNP	4.8%	3.2%	0.9%	4.9%
		Southeast RNP	2.6%	1.3%	0.5%	2.7%
		East RNP	5.2%	2.6%	1.0%	5.4%
		Southwest Visual	—	3.2%	5.4%	—
		Southeast Visual	—	1.3%	1.5%	—
		Northeast Visual	—	2.6%	2.9%	—
	21L	North RNP	9.0%	4.5%	3.3%	9.0%
		Southwest RNP	16.5%	8.3%	3.0%	16.5%
		South RNP	2.3%	1.5%	0.4%	2.3%
		East RNP	2.3%	1.5%	0.4%	2.3%
		Northeast Visual	—	4.5%	3.3%	—
		Southwest Visual	—	8.3%	9.1%	—
		South Visual	—	1.5%	2.5%	—
Ultimate Runway	3L	Southwest RNP	4.8%	3.2%	0.9%	4.9%
		North RNP	4.8%	3.2%	0.9%	4.9%
		Southeast RNP	2.6%	2.6%	0.7%	2.7%
		East RNP	5.2%	2.6%	0.7%	5.4%
		Southeast Visual	—	2.6%	4.4%	—
		Southwest Visual	—	3.2%	5.4%	—
	21R	North RNP	9.0%	9.0%	6.6%	9.0%
		Southwest RNP	16.5%	8.3%	3.0%	16.5%
		South RNP	2.3%	2.3%	1.7%	2.3%
		East RNP	2.3%	2.3%	1.7%	2.3%
		Southwest Visual	—	8.3%	9.1%	—

Runway 7-25 arrival flight track percentage splits for the Ultimate Scenario are identical to the Base Year values

DEPARTURES

Runway		Flight Track	Aircraft Group			
			Commercial	Business Jet/Turboprop	General Aviation-Propeller	Military
Existing Runway	3R	East	1.6%	1.6%	1.2%	1.6%
		North	0.2%	0.2%	0.1%	0.2%
		South	2.6%	2.6%	1.9%	2.7%
		West	9.6%	9.6%	7.1%	9.9%
		Southwest	3.5%	3.5%	2.6%	3.6%
	21L	East	3.0%	3.0%	2.2%	3.0%
		Southeast	4.5%	4.5%	3.3%	4.5%
		West	16.5%	16.5%	12.1%	16.5%
		Southwest	6.0%	6.0%	4.4%	6.0%
Ultimate Runway	3L	East	4.2%	4.2%	3.1%	4.3%
		North	0.2%	0.2%	0.1%	0.2%
		West	13.1%	13.1%	9.7%	13.5%
	21R	Southeast	7.5%	7.5%	5.5%	7.5%
		West	16.5%	16.5%	12.1%	16.5%
		Southwest	6.0%	6.0%	4.4%	6.0%

Runway 7-25 departure flight track percentage splits for the Ultimate Scenario are identical to the Base Case values

Note: Tables show percent of all operations per each track. Totals developed in coordination with the Spokane Airport Traffic Control Tower

CHAPTER 7

AIRPORT LAND USE COMPATILIBILTY

7.0 INTRODUCTION

On-airport aviation-related development is typically compatible with aircraft operations. On-airport land uses are generally determined by FAA design and safety standards that are enforced by the airport sponsor. On-airport development is guided by the FAA-approved airport layout plan, so even non-aviation facilities located on airport property tend to be appropriately planned and sited. The ability of an airport to manage off-airport land uses is complicated by the interests of third-party property owners and land use regulations of local governments. Nationwide, the issue of land use compatibility is a growing concern and a matter that is evolving rapidly. The overall objective of aviation-related land use planning is to guide incompatible land uses away from the airport and to encourage compatible land use development. This section identifies the major factors influencing aviation compatibility planning, the role of government, and the resources in place to support compatible growth in the vicinity of GEG.

7.1 UNDERSTANDING THE SIGNIFICANCE

Historically, the focus of airport land use compatibility planning has been residential exposure to aircraft noise and residential encroachment. Although noise exposure is still a primary consideration for evaluating land use compatibility, improved engine and airframe technologies have reduced the noise footprint being generated by aircraft. As a result, the areas surrounding commercial service airports are generally quieter than they were 20 years ago. Airport land use compatibility planning has since transitioned to a more holistic and collaborative approach with safety, human environment, airport utility, and economic vitality driving policy guidelines.

7.1.1 Safety

A primary objective for land use compatibility planning is to maintain a safe operating environment by avoiding or mitigating certain types of land uses. At a minimum, airport land use compatibility planning should take into account federal regulations pertaining to development in the vicinity of an airport (C.F.R. Title 14, Part 77, *Obstructions to Navigation)* and other guidance developed by the FAA. Items of primary concern to the FAA include: the height of obstacles primarily along the extended runway centerline, minimizing and mitigating wildlife hazard attractants (i.e., birds), and avoiding or mitigating uses which could cause visual or electronic interference. Areas within the Runway Protection Zones (RPZ), are to be kept as clear as possible and should specifically avoid the storage of flammable/explosive material and uses that draw public assembly (e.g., community/religious centers, schools, etc.). State and local governments may establish additional safety-related criteria. While these are not uniform across the country, these are intended to further reduce the level of risk to people on the ground in the event of an accident. One common method of land use control is an airport overlay zone, which establishes use restrictions, population density limits, and building to open-space ratios that exceed underlying zoning.

7.1.2 Human Environment

This factor primarily relates to aircraft noise exposure. Noise contours, such as the ones developed in Chapter 6, should be used in establishing a range of permissible land uses. Generally, residential development is the most “noise sensitive” and industrial development and open space is the least. An evolving trend is to identify the “human environment” instead of noise specifically. Increasingly, land use compatibility planning has been incorporating elements related to visual nuisances associated with overflight and airport/aircraft lighting. Air quality, specifically aviation fuel odor, is increasingly being scrutinized.

7.1.3 Airport Utility

Certain types of development and activities can restrict the operating utility of an airport if they develop nearby. For example, the construction of a tall building or sports stadium in the vicinity of an airport could reduce the amount of weight an aircraft may depart with or could alter approach departure procedures to reduce efficiency. The emphasis is to protect, preserve, and enhance investments in the airport’s infrastructure to allow maximum utility to the travelling public and to support regional economic growth.

7.1.4 Sustaining Economic Vitality

Airports provide employment and economic benefits to communities through the movement of people and goods, promotion of tourism and trade, stimulation of business development, and the opportunity for a wide variety of jobs. Land use decisions that conflict with aviation activity and airport facilities can result in undue constraints being placed on airport operations and expansion, thereby limiting economic growth for the larger region.

7.2 ROLES AND RESPONSIBILITIES

This section describes the general roles and responsibilities of those involved in implementing actions to enhance off-airport land use compatibility.

7.2.1 Federal Aviation Administration (FAA)

The FAA is responsible for maintaining a safe and efficient air transportation system. Federal Aviation Regulations and FAA FAA Orders and FAA Advisory Circulars (ACs) define metrics for evaluating impact, both positive and negative, on the nation's air transportation system. The FAA distributes funds to support the development of master plans, noise and land use studies, and environmental studies for airport development projects, and to expand and maintain airports in a safe and efficient condition.

The FAA is also responsible for the utilization of airspace and control of aircraft through its air traffic control facilities; for the implementation of flight standards (airworthiness of aircraft and noise standards of aircraft, for example); for navigation aids and other facilities necessary to provide a safe and efficient air transportation system; and for ensuring that airports comply with grant assurances connected to the federal funding.

Most directly related to development in the vicinity of an airport, the FAA assesses project proposals that are subject to the notification/alteration requirements of CFR Title 14, Part 77, *Objects Affecting Navigable Airspace* (FAR Part 77). In these cases, the FAA studies and ultimately issues a determination (hazard or non-hazard). In the event of a hazard determination, the FAA will identify the aviation impacts and possible mitigation options. The local government having jurisdiction must ultimately use this information for deciding whether to approve, deny, or modify a specific development proposal.

Airport Grant Assurance #20, Hazard Removal and Mitigation – Airport sponsor will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting, or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards.

Airport Grant Assurance #21, Compatible Land Use – Airport sponsor will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft. In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which Federal funds have been expended.

General: The continued allocation of federal funds is dependent up on the airport sponsor's compliance with the grant assurance obligations. Most project-specific assurances are valid for 20 years. Unless released, federal assurances related to the acquisition or transfer of real property may be en force in perpetuity.

7.2.2 Local Land Use Controls

The role of local land use agencies is critical to the effective oversight of airport land use compatibility controls. In the case of GEG, there are three district local governments that directly influence airport land use compatibility surrounding the airport: City of Spokane, Spokane County, and City of Airway Heights. On January 1, 2012, the entire airport property (known as the West Plains Area) was annexed from the County by the City of Spokane. Simultaneously, the City of Airway Heights annexed an area east of Hayford Road, known as the East Area Annexation that abuts a small portion of the airport's boundary northwest of the passenger terminal.

City of Spokane

In 2012, the City of Spokane adopted Airport Overlay Zoning consistent with the WSDOT Airport and Compatible Land-Use Program Guidebook, including the equivalent compatibility zones identified in the preceding sub-section. The zoning ordinance detailing the Airport Overlay Zone (AOZ) is detailed in Chapter 17C.180, *Airfield Overlay Zones,* of the City's municipal code. The language is exemplary in both definition and process. The current code identifies 5 distinct overlay zones instead of the 6 exemplified by the State in the previous sub-section. The City combined two of the zones (State Zones 3 and 4) into one. For each of the five overlay zones, specific uses are classified as: permitted use (P), limited use (L), conditional use (CU), and not permitted (N). The use classifications included in the matrix are: residential, high intensity, vulnerable occupant, critical community infrastructure, hazardous use, and low intensity. The code allows for review determinations to be made by the airport director in certain circumstances.

In addition to the five overlay zones, the municipal code incorporates the airport imaginary surfaces identified in CFR Title 14, Part 77 [and any revisions to it] by reference as a height restriction, also referencing the FAA airspace notification and review procedures and required form submissions. The code also establishes an Airfield Noise Zone (ANZ) for those areas within one-eighth of a mile where it has been determined that existing or potential noise levels exceed 65 DNL (day-night average sound level), which is included in the use matrix for the same use classifications (residential, high intensity, etc.). The noise zone is updated periodically, combining the activity of GEG and the adjacent Fairchild Air Force Base (Fairchild AFB). **Figure 7.1** depicts the City's AOZ and ANZ.

Spokane County

Chapter 14.702 of the County Zoning Ordinance is titled Airport Overlay (AO) Zone. Its stated purpose is to reduce the potential for airport hazards and includes references to the State's Planning Enabling Act. Provisions apply to four airports in Spokane County: Spokane International Airport, Felt's Field, Fairchild AFB and Deer Park Airport. Airspace and safety protections are defined based on a three-dimensional conical area extending outward from the primary surface and an approach area defined by a trapezoidal area extending out from the runway ends. Accident Potential Zones (APZ) 1 and 2 are also defined in relation to the approach area. As part of the permit review process, the ordinance regulates hazards, may require an avigation easement and may require the filing of Form 7460-1. Ordinance language addresses height, noise and restricted uses in APZ 1 and 2 and has been revised recently to prevent residential subdivisions in APZ 2. The ordinance language does not correlate exactly with FAR Part 77 (*Objects Affecting Navigable Airspace*), FAR Part 150 (*Airport Noise Compatibility Planning*) or the safety zones presented in the State's Land Use Compatibility Guidebook but the intent is similar in each case.

City of Airway Heights

The City of Airway Heights adopted an identical Airport Overlay (AO) as Spokane County and corresponding language within Chapter 17.15 of its municipal code. The AO Zone provides additional development standards to the base zone pertaining to use and height restrictions, establishes airspace and accident potential areas, restricts hazards to aviation, requires avigation easements and prohibits some uses in noise impact areas. The language is brief and does not directly correspond to FAA standards for Part 77 or the safety zones defined in the State's Land Use Compatibility Guidebook. The language generally addresses aviation land use compatibility issues but relies in several cases on the ability of the administrator to identify unspecified hazards such as wildlife attractants or confirm height limits. The addition of a reference to Form 7460-1 could help fill the gap between the two airspace definitions. A more specific list of design and operational hazards could aid in the review process. Communication between the City and the Airport could also be included in the permit review process to aid in the evaluation process. The City of Airway Heights indicated that it will likely adopt the overlay zone recently approved by the City of Spokane in the near future.

Figure 7.2 identifies the airport overlay zones currently in place for Spokane County and the City of Airway Heights, including the future runway identified in this master plan.

Airport Sponsor and Airport Management

The airport sponsor and management have primary responsibility for the development of on-airport facilities, including efforts to reduce wildlife interaction. Airport owners and operators are responsible for the development of information to support the off-airport compatibility effort. This support includes the preparation of master plans, noise and land use studies, community involvement programs, and interaction with local planners and elected officials related to land use compatibility.

GEG is jointly owned by the City of Spokane and Spokane County and is operated by an independent Airport Board of seven appointees. Airport management performs the expected tasks related to land use compatibility and as required for FAA grant assurance compliance that protect federal and local investment in airport infrastructure. All three local municipalities include provisions for airport management reviews and determinations, which further enhance the ability to maintain compatible development. Finally, GEG and Fairchild AFB management generally coordinate concerns related to airport land use compatibility items and operational procedures given the overlapping airspace, flight corridors, and noise zones. The relationship and coordination efforts should be enhanced in pursuit of common initiatives, some of which are identified in the recent Joint Land Use Study (JLUS) completed by Fairchild AFB.

7.3 AIRPORT LAND USE POLICY RECOMMENDATIONS

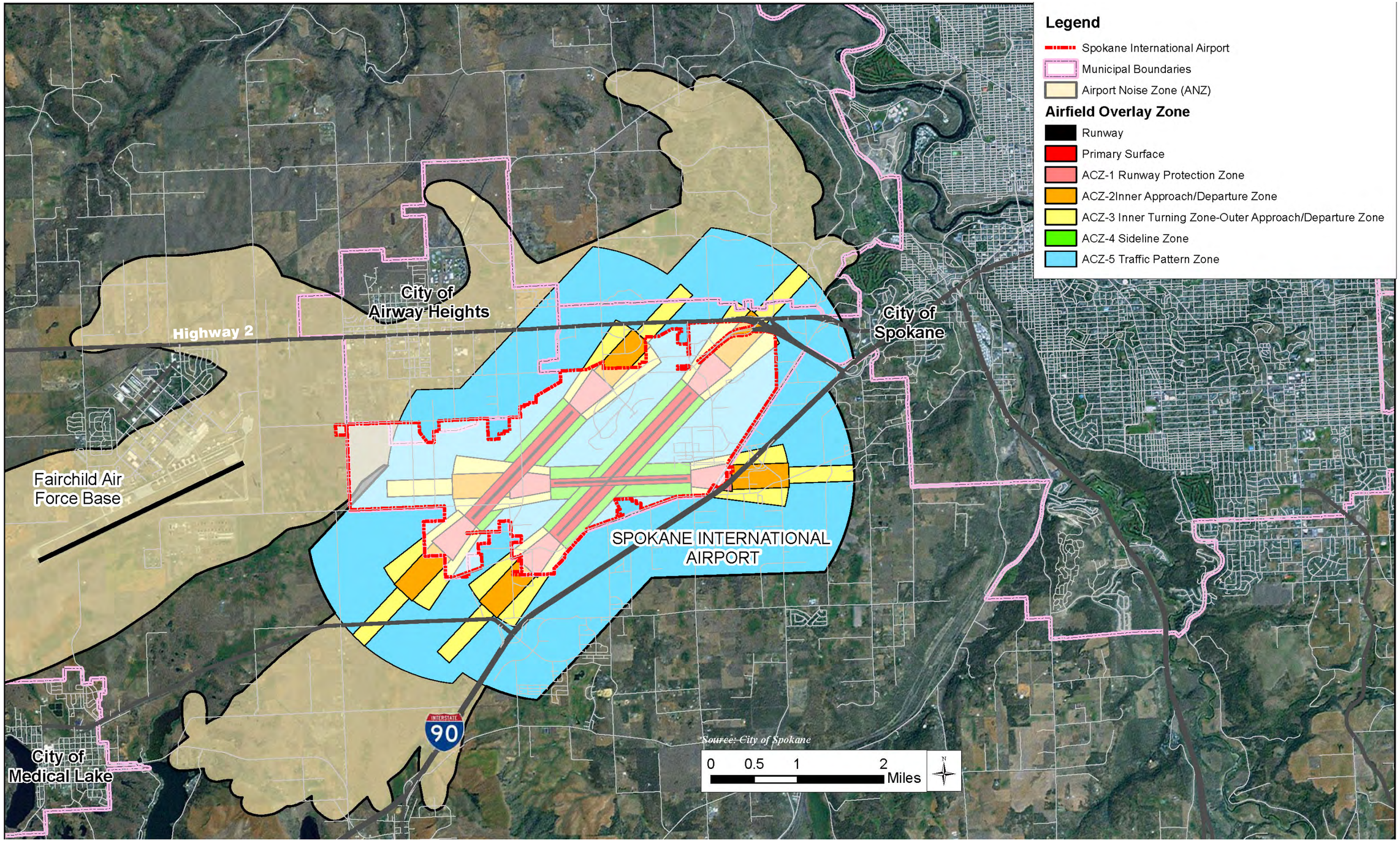
1. Modify the City of Airway Heights Zoning Ordinance to be consistent with the City of Spokane and State guidelines. Incorporate specific references to Part 77 airspace definitions, Form 7460-1 submission requirements and airspace review by the FAA and coordination with GEG staff during the permit review process.
2. Spokane County to update zoning ordinances to be consistent with City of Spokane and State guidelines. Incorporate specific references to Part 77 airspace definitions, Form 7460-1 submission requirements and airspace review by the FAA and coordination with GEG staff during the permit review process.
3. Airport management to maintain and enhance coordination with FAFB and support their overlapping efforts, most recently identified in the JLUS study, including: representation on the JLUS Coordinating Committee (strategy 29), development of public education materials (strategy 38) and providing technical support for the local decision making process (strategy 40).
4. Airport management to review all development proposals within the airport zones and promote a standardized review process with the local municipalities. Airport to consider or otherwise implement an airline review element to this process to account for airline-specific airspace needs, such as the one-engine inoperative routes maintained by the individual airlines for each aircraft type in use.

7.4 CONCLUSIONS

Land use compatibility planning is strategically vital to the airport and neighboring communities. GEG has been proactive in this regard in that it directly controls the real property that is most critical to its operation and growth. The airport should expect that development incursion pressure will continue and likely become more persistent over time. For this reason, airport management should work to develop a streamlined process that supports municipal efforts in completing development and permitting reviews.

For their part, the municipalities have been at the forefront of land use compatibility planning. The major and emerging issues now incorporated into the State Guidebook have long been a part of local ordinance and there has also been across the board consistency for many years. Spokane County and the City of Airway Heights should maintain the consistency by updating the zoning policy to be identical to the one in use by the City of Spokane. Appropriate references to federal regulations (Part 77) for providing notice and review determinations should also be included. In general, this plan recommends that airport management be provided with an opportunity to review all development within the locally established airport zones and to coordinate a streamlined review process that is workable.

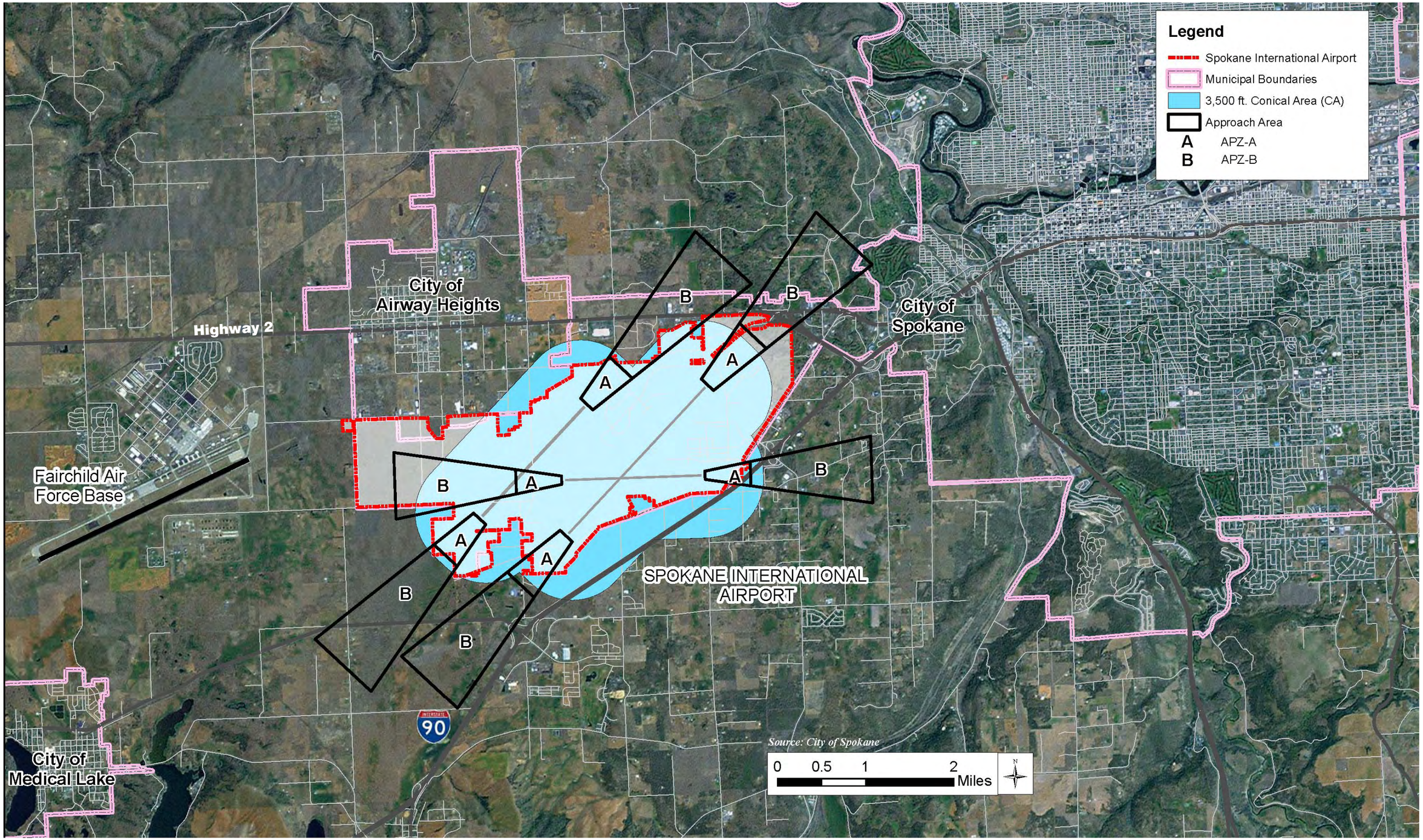
Lastly, communication and outreach is often the key to successful aviation-compatible development strategy. GEG has a somewhat unique opportunity to share or otherwise coordinate efforts and resources with neighboring FAFB in achieving these objectives. The primary compatibility issues as they relate to the surrounding area overlap significantly between the two airfields.



Source: Airport Overlay Zone, City of Spokane

FIGURE 7.1

Airport Overlay Zone – City of Spokane



Source: All Protection Zone dimensions developed from Spokane County Zoning Code, Chapter 14.702 "Airport Overlay Zone"

FIGURE 7.2

Airfield Overlay Zones – Spokane County

CHAPTER 8

FINANCIAL IMPLEMENTATION ANALYSIS

PREPARED BY LEIBOWITZ & HORTON

8.0 FINANCIAL ANALYSIS OBJECTIVES

The primary objective of the Financial Implementation Analysis for the Spokane International Airport Master Plan is to evaluate the Airport's capability to fund the Capital Improvement Program and to finance Airport operations. The program is planned for implementation through three phases of development including a five-year Short Term period (2014-2018), a five-year Intermediate Term period (2019-2023) and a ten-year Long Term period (2024-2033). The analysis includes development of a detailed Financial Implementation Plan. Objectives for developing the Financial Implementation Plan include presenting the results of the implementation evaluation and providing practical guidelines for matching an appropriate amount and timing of financial sources with the planned use of funds.

8.1 OVERALL APPROACH

The overall approach for conducting the Financial Implementation Analysis included the following steps:

- Gathering and reviewing key Airport documents related to historical financial results, capital improvement plans, operating budgets, regulatory requirements, Airport policies, airline agreements and other operating agreements with Airport users

- Interviewing key Airport officials to gain an understanding of the existing operating and financial environment, relationships with the airlines and overall management philosophy

- Reviewing the aviation traffic forecast previously developed in the Master Plan

- Reviewing the Capital Improvement Program project cost estimates and development schedules anticipated for the planning period and projecting the overall financial requirements for the program

- Determining and analyzing the sources and timing of capital funds available to meet the financial requirements for operating the Airport and financing the Capital Improvement Program

- Analyzing historical operations and maintenance expenses, developing operations and maintenance expense growth assumptions, reviewing assumptions with Airport management and projecting future operations and maintenance expenses for the planning period

- Analyzing historical revenue sources, reviewing the Airport's existing rates and charges methodology, developing revenue growth assumptions, reviewing assumptions with Airport management and projecting future airline and non-airline revenues for the planning period

- Completing results of the review in a Financial Analysis Summary that evaluates the financial reasonableness of the Capital Improvement Program.

8.2 CAPITAL FUNDING SOURCES

In the past, the Airport has used a combination of FAA Airport Improvement Program (AIP) entitlement and discretionary grants, VALE grants, passenger facility charges, debt financing, rental car customer facility charges and cash reserves/net revenues to fund capital improvements. These funding sources will continue as the Airport's primary sources to finance the Master Plan Capital Improvement Program (CIP).

8.2.1 Airport Improvement Program Grants

The Airport receives grants from the Federal Aviation Administration (FAA) to finance the eligible costs of certain capital improvements. These federal grants are allocated to commercial passenger service airports through the Airport Improvement Program (AIP). AIP grants include passenger entitlement grants which are allocated among airports by a formula that is based on passenger enplanements; cargo entitlement grants which are allocated among airports by a formula that is driven by cargo aircraft landed weight; and discretionary grants which are awarded in accordance with FAA guidelines. In February 2012, after several years of continuing budget resolutions in Congress, the FAA Modernization and Reform Act of 2012 was enacted and authorizes funding for the AIP through September 30, 2015. Under this AIP reauthorization legislation, eligible projects are funded on a 90% AIP grant/10% local match basis for small

and non-hub airports. Under this authorization, the Airport is projected to receive current year entitlements of about $4.5 million in 2014 and future annual grants which are projected to grow to $6.1 million by 2033 - the end of the planning period. Small-Hub airports (those with annual enplanements ranging between about 360,000 to 1.8 million passengers) can accumulate up to two years of unspent entitlements plus the current year before the awards are revoked. For 2013, the Airport did had not have unspent entitlements to carry forward for future year expenditures. The implementation analysis assumes the application of AIP passenger/cargo entitlement funds will be about $24.4 million during the Short Term planning period, $26.6 million during the Intermediate Term and $60.4 million during the Long Term.

The approval of AIP discretionary funding is based on a project eligibility ranking method the FAA uses to award grants, at their discretion, based on a project's priority and importance to the national air transportation system. In the past, Spokane has received discretionary funding support for various eligible capital projects. It is reasonable to assume that the Airport will receive additional discretionary funding during the planning period for higher priority, eligible projects, such as the taxiway reconfiguration, ARFF facilities, runway overlays and replacement of the ATCT as well as other airfield pavement projects anticipated in future years. The implementation analysis assumes the application of AIP discretionary funds will be $20.2 million during the Short Term, about $3.8 million during the Intermediate Term and about $36.6 million during the Long Term planning periods. Since the future availability of AIP discretionary grants is not certain until an actual grant is awarded, it should be noted that any CIP projects which have discretionary funds indicated as a funding source in the implementation plan may need to be delayed until such funds actually become available.

The implementation analysis further assumes that the current AIP program will continue to be extended through 2033 and that future program authorizations will provide substantially similar funding levels as it currently does and as it has historically provided since the program was established in 1982.

8.2.2 Transportation Security Administration Funding

The Transportation Security Administration (TSA) provides grants of up to 90% of the cost for eligible security related projects and pays 100% of the cost of explosion detection systems (EDS). The analysis assumes that TSA will provide funding about of $5.6 million for replacement of EDS **equipment in the Short Term planning period.**

8.2.3 Washington State Grants

The implementation analysis assumes that Washington State DOT will provide highway fund grants for certain roadway projects totaling about $5.7 million in the Short Term planning period.

8.2.4 Voluntary Airport Emission Program (VALE) Grants

In 2004, Vision 100 legislation established the Voluntary Airport Low Emissions Program to support the

air quality improvement project efforts of commercial service airports located in environmental non-attainment areas and to maintain certain national air quality standards. Spokane qualifies for the program. Projects are funded through the AIP and/or PFC programs for grants up to 90% of eligible costs for non-hub and small hub airports. Eligible projects include alternative fuel vehicles, gate electrification, remote ground power, ground support equipment, geothermal heating systems, solar hot water, underground fuel hydrant systems and other projects. The implementation analysis assumes that the Airport will receive VALE grants for eligible projects of about $2.7 million in the Short Term planning period.

8.2.5 Passenger Facility Charges

The Aviation Safety and Capacity Expansion Act of 1990 established the authority for commercial service airports to apply to the FAA for imposing and using a Passenger Facility Charge (PFC) of up to $3.00 per enplaned passenger. With the passage of AIR-21 in June 2000, airports could apply for an increase in the PFC collection amount from $3.00 per eligible enplaned passenger to $4.50. The proceeds from PFCs are eligible to be used for AIP eligible projects and for certain additional projects that preserve or enhance capacity, safety or security; mitigate the effects of aircraft noise; or enhance airline competition. PFCs may also be used to pay debt service on bonds (including principal, interest and issue costs) and other indebtedness incurred to carry out eligible projects. In addition to funding future planned projects, the legislation permits airports to collect PFCs to reimburse the eligible costs of projects that began on or after November 5, 1990.

Since 1993, Spokane has submitted six PFC applications that are closed and three (PFC #7, #8 and #9) that were open and in effect as of December 31, 2013 with a total collection authority of $49.2 million and $7.5 million remaining to be collected. Cumulative expenditures through 12/31/13 were $46.4 million with $2.8 million left to spend. The current estimated PFC charge expiration date is November 2015.

The implementation analysis assumes that the Airport will submit additional PFC applications and amendments, as required, to ensure that the collection of PFC revenues continues beyond the authorized expiration date through the end of the twenty-year planning period in 2033. The implementation analysis specifically assumes that PFCs will be used to service a $44.5 million debt issue during the Short Term period for a 30 year term to finance terminal area improvements related to expansion of the terminal concourses and certain passenger service improvements. The implementation analysis further assumes that PFCs will be used during the Short Term on a pay-as-you-go basis to fund an additional $16.7 million for terminal area improvements as well as $14.7 million in the Intermediate Term and $49.1 million in the Long Term. Overall PFC pay-as-you-go revenues are expected to fund $17.8 million in project costs during the Short Term planning period, $29.0 million during the Intermediate Term and about $53.9 million during the Long Term.

8.2.6 Debt Financing

In the past, the Airport has used debt financing to fund capital improvements that could not be funded by other means. Currently, portions of the Airport's 2008 and 2010 revenue bonds and its CERB (Community Economic Revitalization Board) loans from WA State, are outstanding and require about $3 million annual cash flow for debt service. All of the Airport's current debt is scheduled to be paid off early during the Intermediate Term period. The Airport's sound financial condition, annual net operating cash flow and the availability of future PFC revenues allows the Airport to consider additional debt for needed capital projects. As indicated in the implementation analysis, the Airport anticipates issuing $24 million in 2014 debt for hangar development that will be serviced with cash and $44.5 million in 2015 debt for terminal area improvements that will be serviced with PFC revenues.

8.2.7 Rental Car Customer Facility Charges

In the last several years, rental car Customer Facility Charges (CFCs) have become common financing tools for landside improvements and overall cash flow enhancement at airports in the U.S. Such charges are collected by rental car companies that provide services to commercial passengers at the airports they serve. CFCs are imposed by local governmental resolution and are collected by the rental car companies in trust on behalf of, and for the benefit of, the airports where they operate. The charges are based on a fee (commonly $3-$4) per rental car transaction day that is added to rental car contracts. For 2014, rental car CFCs are estimated to be $2.5 million and are projected to total $73 million during the 20 year planning period ending in 2033.

8.2.8 Private 3rd Party Funding

Many airports use private 3rd party financing when the planned improvements will be primarily used by a private business or other organization especially if the airport is unable to make such an investment or if it is logically more advantageous for the airport to seek private funding. Projects of this kind typically include hangars, FBO facilities, cargo facilities, exclusive aircraft parking aprons, industrial development areas, non-aviation commercial areas and various other projects. Such projects are often not eligible for federal funding. The implementation analysis assumes that private 3rd parties will provide $4.8 million in project financing during the Intermediate Term period for the construction of new air cargo facilities at Spokane. If market demand does not attract this level of private investment during the anticipated time frame, the associated projects may be delayed until demand warrants development.

8.2.9 Cash Reserves/Airport Net Operating Revenues

Due to historically sound financial practices, the Airport has accumulated about $29.7 million in cash reserves at the beginning of 2014 and anticipates generating $4.7 million in 2014 growing to about $30 million annually in net operating revenues (less existing debt service) by the end of the 20 year planning

period. As a result, the Airport plans to use its operating cash flow to fund $92.4 million in capital project costs during the Short Term planning period, about $86.1 million during the Intermediate Term and about $307.7 million during the Long Term.

8.2.10 Other Unidentified Funding

Conclusions of the Financial Implementation Analysis indicate that the traditional capital funding sources available to Spokane described in the preceding paragraphs are insufficient in amount and timing to finance all the projects indicated in the 20 year CIP. Consequently, funding sources during each of the planning periods for the indicated projects remain unidentified and development of these projects will need to be delayed or cancelled if adequate funding cannot be determined when needed. The implementation analysis indicates that other unidentified funding relates to $21.7 million in project costs for the Short Term, $29.2 million for the Intermediate Term and $296.4 million for the Long Term.

8.3 FINANCIAL ANALYSIS AND IMPLEMENTATION PLAN FOR THE MASTER PLAN CAPITAL IMPROVEMENT PROGRAM

This analysis, along with the tables presented at the end of Chapter 8, provides the results of evaluating the financial reasonableness of implementing the Master Plan Capital Improvement Program during the twenty-year planning period from 2014 through 2033.

8.3.1 Estimated Project Costs and Development Schedule

The Capital Improvement Program (CIP) Estimated Project Costs and Development Schedule is derived from previous results of the Master Plan analysis. The CIP for capital expansion and improvement projects is projected on an annual basis for the Short Term planning period from 2014 through 2018, in total for the Intermediate Term planning period from 2019 through 2023 and in total for the Long Term planning period from 2024 through 2033. For each of these planning periods, Table 8-1 (provided at the end of Chapter 8) presents the Capital Improvement Program including estimated costs and anticipated development schedule for the identified projects.

As shown in **Table 8-1**, the total estimated cost of projects is $881,443,362 in 2014 dollars. The estimated costs for projects scheduled during the period 2015 through 2033 are adjusted by an assumed 3% rate of annual inflation. The resulting total project costs escalated for inflation are $1,210,665,729. Exhibit 8-1 presents a summary of the Table and provides a comparison of 2014 base year costs with escalated costs adjusted for inflation for each of the planning periods.

EXHIBIT 8-1. SUMMARY OF 2014 BASE YEAR AND TOTAL ESCALATED COSTS FOR THE MASTER PLAN CAPITAL IMPROVEMENT PROGRAM

Planning Periods	2014 Base Year Costs	Total Escalated Costs
Short Term Projects (2014-2018)	$234,861,862	$243,554,144
Intermediate Term Projects (2019-2023)	148,133,000	189,487,469
Long Term Projects (2024-2033)	498,448,500	777,624,116
Total Project Costs	$881,443,362	$1,210,665,729

Source: Leibowitz & Horton AMC analysis

8.3.2 Sources and Uses of Capital Funding

Funding sources for the CIP depend on many factors, including AIP and PFC project eligibility, the ultimate type and use of facilities to be developed, management's current and desired levels of the Airport's airline cost per enplaned passenger, the availability of other financing sources and the priorities for scheduling project completion. For master planning purposes, assumptions were made related to the funding source of each capital improvement.

Table 8-2 lists each of the CIP projects, their estimated costs (escalated annually for inflation) and the assumed funding sources and amounts. In the Short Term planning period (2014-2018), it was assumed that AIP entitlement and discretionary grants were primarily used to fund taxiway, glycol management and new ARFF facility projects. PFC serviced debt and PFC pay-as-you-go revenues were used to fund the terminal building and terminal area related projects. Airport cash reserves and net operating revenues were used to fund numerous ineligible projects as well as some eligible projects for which a sufficient amount of AIP funding was not available. Cash reserves included proceeds from an assumed $24 million 2014 debt issue used to finance construction of a new MRO hangar development. For the Short Term planning period, the implementation analysis also indicated that adequate funding for $21.7 million in project costs could not be identified. The “funding source” shown on Table 8-2 for these projects was indicated as “Other Unidentified Funding”.

In the Intermediate Term planning period (2019-2023), it was assumed that AIP entitlement and discretionary grants were primarily used to fund runway, taxiway, aircraft apron and glycol recovery system projects. PFC pay-as-you-go revenues were primarily used to fund the terminal building and terminal area related projects as well as taxiway and SRE/ARFF equipment projects. Airport cash reserves and net operating revenues were used to fund numerous ineligible projects as well as some significant eligible projects for which a sufficient amount of AIP/PFC funding was not available - a portion of the phase 2 terminal expansion, a road realignment, property acquisition, parking garage work and several other improvements are included in these projects. Private 3rd party financing was assumed as a funding source for a new air cargo building. For the Intermediate Term planning period, the implementation analysis also indicated that adequate funding for $29.2 million in parking garage project costs could not be identified - thus, "Other Unidentified Funding" was indicated as the funding source.

In the Long Term planning period (2024-2033), it was assumed that AIP entitlement and discretionary grants were primarily used to fund runway extension, taxiway, deicing apron, ARFF vehicle, eligible roadway work and ATCT replacement projects. PFC pay-as-you-go revenues were primarily used to fund terminal building and terminal area related projects as well as taxiway improvements. Airport cash reserves and net operating revenues were used to fund numerous ineligible projects as well as some significant eligible projects for which a sufficient amount of AIP/PFC funding was not available - included are a portion of the phase 3 terminal expansion, runway extension, property acquisition, parking garage expansion & related improvements, various roadway work, ATCT replacement and other projects.

For the Long Term planning period, the implementation analysis also indicated that adequate funding for $296.4 million in new runway costs could not be identified - thus, "Other Unidentified Funding" was indicated as the funding source.

A summary of the sources of capital funding by type and uses of capital funding by planning period for the CIP is presented in **Exhibit 8-2.**

EXHIBIT 8-2. SUMMARY OF SOURCES AND USES OF CAPITAL FUNDING FOR THE MASTER PLAN CAPITAL IMPROVEMENT PROGRAM

Sources of Capital Funding	Short Term (2014-18)	Mid Term (2019-23)	Long Term (2024-33)	Totals
AIP Entitlement/Cargo Grants	$24,387,429	$26,559,118	$60,384,382	$111,330,929

AIP Discretionary Grants	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	5,600,000	0	0	5,600,000
State Grants	5,696,000	0	0	5,696,000
VALE Grants	2,700,000	0	0	2,700,000
Passenger Facility Charges	70,975,099	38,987,521	77,565,141	187,527,760
Private 3rd Party Funding	0	4,847,323	0	4,847,323
Other Unidentified Funding	21,651,111	29,167,554	296,361,705	347,180,370
Cash Reserves/Net Operating Revs	92,359,434	86,110,534	307,677,592	486,147,561
Total Sources of Capital Funding	$243,554,144	$189,487,469	$777,624,116	$1,210,665,729
Uses of Capital Funding				
Runway/Taxiway Improvements	$40,525,556	$20,904,080	$421,129,937	$482,559,573
Aircraft Apron Improvements	16,150,000	5,453,238	9,226,797	30,830,036
Cargo Facility Improvements	100,000	4,847,323	0	4,947,323
Terminal Building Expansion/Improvements	79,075,000	36,354,922	105,926,658	221,356,580
Landside Improvements-Auto Parking, GT & Roads	18,285,750	46,831,198	110,599,048	175,715,997
SRE/ARFF Improvements	5,600,000	0	5,104,990	10,704,990

General Aviation/Aero Development	57,407,778	13,451,321	15,125,897	85,984,996
VALE Projects	3,000,000	0	0	3,000,000
Other SIA Projects	3,155,000	44,096,097	63,096,168	110,347,264
Felts Projects	8,117,778	6,059,154	15,125,897	29,302,829
Business Park Projects	3,445,000	1,514,788	8,612,686	13,572,474
Terminal Financing Costs for Debt Serviced with PFCs	8,692,282	9,975,348	23,676,036	42,343,666
Total Uses of Capital Funding	$243,554,144	$189,487,469	$777,624,116	$1,210,665,729

Source: *Leibowitz & Horton AMC analysis*

Note: *Addition errors are due to rounding of calculated amounts.*

8.3.3 Debt Capacity and Debt Funding Requirements

The funds flow section of Table 8-1 provides an overall analysis of the annual availability of the Airport's various funding sources along with an indication of the adequacy of cash flow (both capital and operating) to meet funding needs of the capital program. The planned project development schedule presented in Table 8-1 indicates significant funding needs to support expansion/improvement of the terminal building and related terminal area facilities and a new MRO hangar building during the Short Term planning period. Because of insufficient cash reserve balances and net operating cash flows, these projects cannot be achieved without debt financing.

The Airport's current debt capacity is based on the Airport's level of cash flow available to service debt while still maintaining a sound financial condition. The Airport's most appropriate cash flow source to pay debt service for the terminal expansion and hangar projects is Spokane's future PFC revenue and net operating cash flow. The Airport's current level of PFC revenue is approximately $6.5 million per year which would be supplemented by net operating revenues (about $10.1 million in 2015, less existing debt service of $3.4 million = $6.7 million available for new debt service) to provide a total of about $13.2 million per year available to pay new debt service.

Table 8-3a at the end of Chapter 8 provides a summary level debt service schedule assuming a net proceeds requirement of $44.5 million for the terminal project, a 1/1/2015 issue date, a 5.0% interest rate, a 30 year term and level debt service payments of $2.9 million per year. Table 8-3b provides a summary level debt service schedule assuming a net proceeds requirement of $24 million for the hangar project, a 7/1/2014 issue date, a 5.0% interest rate, a 30 year term and level debt service payments of $1.6 million per year. No assumptions were provided for issue costs and reserve requirements that would be part of the structure of an actual debt issue. Total annual debt service for the two issues would be $4.5 million compared with the availability of $13.2 million (beginning in 2015) in cash flow from PFCs and net operating revenue to pay the debt.

The Airport could manage this level of debt funding (for both the terminal and hangar projects) very reasonably within a financially prudent capital implementation plan. As shown in the funds flow section of Table 8-1, these minimally structured debt issues result in an approximate debt service coverage ratio ranging from 2.05x in 2015 to about 2.87x in 2018 (including the new debt and existing debt).

8.3.4 Projected Operations and Maintenance Expenses

Operations and maintenance expense projections for the Short Term (2014 to 2018), the Intermediate Term (2019 to 2023) and the Long Term (2024 to 2033) planning periods are based on the Airport's 2013 expense estimate, the anticipated impacts of inflation, aviation traffic increases, facility improvements and the recent experience of other similarly-sized airports.

Operations and Maintenance Expense Projection Assumptions

Operations and maintenance expense growth assumptions, as reflected in Table 8-4, were developed to project the Airport's operating expenses during the planning period. Actual amounts for 2011 and 2012 and estimated amounts for 2013 provide a comparison with expenses that are projected for the period 2014 through 2033. The following expense cost centers/departments are presented in the table:

- Airfield
- Terminal Building
- Parking/Landside
- Hangars, Buildings & Leased Sites
- Operations
- Engineering
- Aircraft Recuse & Fire Fighting (ARFF)
- Police
- Information Technology
- Communications

- General Administration
- Fuel Facility

Individual line item expenses for each cost center/department include payroll/employee benefit costs, utilities, insurance, maintenance, supplies, environmental, equipment, contractual services, professional fees and other expenses which are all projected to grow beginning in 2014 at an assumed annual 3% inflation rate. Additionally, due to facility expansion projects, the terminal building cost center includes 5% operating expense increases in 2016 through 2018, a 10% increase in 2022 and a 15% increase in 2030. Due to development of a new maintenance/repair/overhaul (MRO) aircraft hangar in 2014, the hangars, buildings & leased sites cost center includes a $20,000 annual expense increase beginning in 2015.

Projection of Operations and Maintenance Expenses and Operating Expenses Per Enplaned Passenger

The projection of operations and maintenance expenses is provided in Table 8-4. As shown in the table, total expenses are expected to grow from $18,133,622 estimated in 2013 to $21,709,064 in 2018 reflecting an overall growth rate of 3.7% per year and a total of $100,530,142 during the Short Term planning period. Intermediate Term expenses are projected to total $120,056,728 reflecting a 3.5% annual growth rate for the five-year period 2019-2023 and Long Term expenses are projected to total $309,359,888 reflecting a 3.4% annual growth rate for the ten-year period 2024-2033.

Table 8-4 also provides a comparison of Spokane's total operating expenses per enplaned passenger versus the industry average for small-hub airports. Spokane's operating expenses per enplaned passenger are projected to decline from $11.58 estimated for 2013 to an average of $10.79 during the Long Term planning period. Over the same period of time, the industry average for small-hub airports grows from $33.13 in 2013 to an average of $52.58 during the Long Term (Source: FAA Operating and Financial Summary Report #127 for small-hubs and FAA Air Carrier Activity Information System enplanement database). This comparison shows that estimated and projected operating expenses at Spokane are 65% to 79% lower than other airports of similar size throughout the twenty-year planning period. This implies that the Airport currently manages operations in a very cost efficient manner and is expected to continue management practices that will yield cost efficient results in future years.

8.3.5 Projected Operating Revenues

Table 8-5 presents actual, estimated and projected operating revenues for the Airport from 2011 through 2033. Actual amounts for 2011 and 2012 and estimated amounts for 2013 provide a comparison with revenues that are projected for the period 2014 through 2033. Assumptions for all revenue categories are presented in the following section.

Operating Revenue Projection Assumptions

Operating revenue projections for the Short Term (2014 to 2018), the Intermediate Term (2019 to 2023) and the Long Term (2024 to 2033) planning periods are based on the Airport's 2013 estimate, current leasing practices, the anticipated impacts of inflation, aviation traffic increases, facility expansions and the recent experience of other similarly-sized airports. Annual revenue growth assumptions for the period 2014 through 2033 are provided in the following sections.

- Airline Revenues

  -Landing Fees (Signatory and Non-Signatory Passenger Airlines) - Projections are based on the 2013 estimate with growth at a 3% annual inflation rate and plus increases in aircraft landed weight using annual growth at ½ the rate of Master Plan forecast of passenger enplanements. This reflects the airlines' practice of managing increased load factors before additional flights are provided.

  -Landing Fees (Signatory and Non-Signatory Non-Passenger Airlines) - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

  -Ramp Overnight (RON) Aircraft Parking (Signatory Passenger Airlines) - Projections are based on the 2013 estimate with growth at a 3% annual inflation rate and plus increases in aircraft landed weight using annual growth at ½ the rate of Master Plan forecast of passenger enplanements.

  -Ramp Overnight (RON) Aircraft Parking (Non-Signatory Non-Passenger Airlines) - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

  -Field Use Fees - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

  -Terminal Rent - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

  -Jetway Rental - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

  -Ground Services - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

- Non-Airline Revenues

-Public Parking Fees - Projections are based on the 2013 estimate with 3% annual inflation plus the annual rate of forecast enplanement growth.

-FBO Hangars & Building Rent - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

-Cargo Building Rent - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

-Other Building Rent - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

-New MRO Hangar Rent - Projections are based on the preliminary memorandum of understanding which indicated rent of $1,108,915 for 2015 through 2019 and rent of $1,171,177 for 2020 through 2033.

-Other Commercial Operators Building Rent - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

-Leased Land Rent - Projections for the following entities are based on the estimate for 2013 with 3% annual inflation growth thereafter:

--FBO

--Other Commercial Operators

--Motel

--Rental Car Service Areas

--Other Land

--Local Government

--Federal Government

-Terminal Rent, Concessions & Fees - Projections for the following entities are based on the 2013 estimate with 3% annual inflation plus the annual rate of forecast enplanement growth:

--Commercial Vehicle Trip Fees

--Food & Liquor Concessions

--Store Tenants Concessions

--Car Rental Concessions

--Vending Machine Concessions

-Terminal Rent, Concessions & Fees - Projections for the following entities are based on the estimate for 2013 with 3% annual inflation growth thereafter:

--Office Tenants

--GTC Rent

--Other Rentals

--Advertising Concessions

--Telephone Commissions

--Other

-Other Fees & Cost Recovery Charges - Projections for the following entities are based on the estimate for 2013 with 3% annual inflation growth thereafter:

--Parking Infractions

--Telephone Cost Recovery

--Force Account Recovery

--Recovery Account

--A/R-Finance Charges

--Other

-Fuel Flowage Fees (Passenger Airlines) - Projections are based on the 2013 estimate with growth at a 3% annual inflation rate and plus increases in aircraft landed weight using annual growth at ½ the rate of Master Plan forecast of passenger enplanements.

-Fuel Flowage Fees (General Aviation & Non-Passenger Airlines) - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

- Non-Operating Revenues

  -Operational Interest - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

  -Salvage Sales & Other - Projections are based on the estimate for 2013 with 3% annual inflation growth thereafter.

Projection of Operating Revenues, Airline Cost Per Enplaned Passenger and Operating Revenues Per Enplaned Passenger

The projection of operating revenues is provided in Table 8-5 at the end of Chapter 8. As shown in the table, airline revenues are expected to grow from $8,424,635 estimated for 2013 to $9,972,129 projected for 2018 with a total of $46,470,035 during the five-year Short Term planning period. During the five-year Intermediate Term period, airline revenues are projected to total $55,727,176 and during the ten-year Long Term period, airline revenues are projected to total $147,041,753. The overall annual growth rate for airline revenues is 3.6% during the twenty-year planning period. Non-Airline revenues are expected to grow from $16,753,367 estimated for 2013 to $24,060,330 projected for 2018 with a total of $105,935,584 during the Short Term period. During the Intermediate Term period, non-airline revenues are projected to total $145,080,609 and during the Long Term period, non-airline revenues are projected to total $456,853,828. The overall annual growth rate for non-airline revenues is 6.5% during the twenty-year planning period. Non-Operating revenues are expected to grow from $279,631 estimated for 2013 to $324,169 projected for 2018 with a total of $1,529,137 during the Short Term period. During the Intermediate Term period, non-operating revenues are projected to total $1,772,689 and during the Long Term period, non-operating revenues are projected to total $4,437,378. The overall annual growth rate for non-operating revenues is 3.0% during the twenty-year planning period. Total Airport revenues are expected to grow from $25,457,633 estimated for 2013 to $34,356,628 projected for 2018 with a total of $153,934,756 during the Short Term period. During the Intermediate Term period, revenues are projected to total $202,580,474 and during the Long Term period, revenues are projected to total $608,332,959. The overall annual growth rate for total Airport revenues is 5.7%.

Table 8-5 also provides a comparison of the Airport's airline cost per enplaned passenger versus the industry average for small-hub airports. The airline cost per enplaned passenger (all airline fees and rentals divided by enplaned passengers) is a measure airlines use to compare their cost of operations among the airports they serve. Spokane's airline cost per enplaned passenger is projected to decline from $5.38 estimated for 2013 to an average of $5.13 during the Long Term planning period. Over the same period, the industry average for small-hub airports is expected to grow from $8.39 in 2013 to an average of $13.31 during the Long Term (Source: FAA Operating and Financial Summary Report #127 for small-hubs and FAA

Air Carrier Activity Information System enplanement database). This result shows that airline rates and charges at Spokane are currently low (36% below the small-hub average) and are projected to remain significantly below those of other similarly-sized airports throughout the twenty-year planning period. However, Spokane's current airline agreements are due to expire in the very near term and the negotiation of new agreements could lead to a revised rate structure that results in higher rates and higher airline revenues that are more in line with the industry averages.

Table 8-5 also provides a comparison of Spokane's total revenues per enplaned passenger versus the industry average for small-hub airports. The Airport's total revenues per enplaned passenger are projected to grow from $16.07 estimated for 2013 to an average of $21.06 during the Long Term planning period. Over the same period, the industry average for small-hub airports is expected to grow from $28.75 in 2013 to an average of $45.63 during the Long Term (Source: FAA Operating and Financial Summary Report #127 for small-hubs and FAA Air Carrier Activity Information System enplanement database). This comparison indicates that total Airport revenues are currently about 44% lower than the industry average and are expected to remain lower throughout the twenty-year planning period. This result is primarily due to lower than average fees and rental amounts charged to the airlines. As indicated previously, Spokane's airline rate structure has potential to improve in the very near term period when new agreements are expected to be re-negotiated. The Airport's practices for setting non-airline rates and leasing facilities appear to be effective in generating non-airline revenues based on its level of commercial aviation activity.

8.3.6 Financial Analysis Summary for the Master Plan Capital Improvement Program

The Financial Plan Summary presented in Table 8-6 at the end of Chapter 8 includes a Capital Cash Flow section that presents a summary of projected capital funding (from Table 8-2) and scheduled capital expenditures **(from Table 8-1)** with the cash flow that results from implementing the Master Plan Capital Improvement Program. **Table 8-6** also includes an Operating Cash Flow section that summarizes totals for operating revenues **(from Table 8-5)** and operating expenses (from Table 8-4) less existing debt service requirements and with the addition of cash reserve balances to provide the cash flow that results from these activities.

In **Table 8-1** of the Financial Implementation Analysis, practical approaches were provided for scheduling capital expenditures to match the availability of capital funding. **Table 8-2** provided practical approaches for matching specific capital funding sources with each of the identified projects. Based on the assumptions underlying the Financial Implementation Analysis summarized in the Capital Cash Flow section of Table 8-6, implementation of those projects in the Master Plan CIP that have specifically identified funding sources, is financially reasonable. Projected end of year cash balances remain positive throughout the twenty-year planning period and estimated debt service coverage ratios provided in the funds flow section of **Table 8-1** (related to both existing and planned new debt) remain above financially prudent levels

(above 1.5x).

However, those projects listed in the Master Plan CIP that do not have specific funding sources identified (indicated as "Other Unidentified Funding") will not be feasible until actual funding sources can be confirmed. The implementation analysis indicated that $21.7 million in Short Term projects could not be funded along with $29.2 million in Intermediate Term projects and $296.4 million in Long Term projects.

Also, implementation of capital projects that have AIP discretionary grants indicated as a funding source are subject to the availability of those grants which are provided at the sole discretion of the FAA. If the identified portion of discretionary funding is not awarded by the FAA, then these projects will need to be delayed until funding is available.

Additionally, the Financial Implementation Analysis relies on achievement of the Master Plan forecast of aviation activity. Actual aviation traffic may temporarily vary from the projected levels of activity without a significant adverse impact on the capital program. If decreased traffic levels occur and persist, implementation of all the proposed projects may not be financially feasible. It should also be noted, however, that if the forecast activity levels are not met, then a number of the planned capital improvements may not be necessary.

8.4 FINANCIAL ANALYSIS TABLES

Financial analysis **Tables 8-1** through **Tables 8-6** are presented on the following pages.

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

GEGMP2013_4.123

Table 8-1

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP PFC TSA STATE VALE

27-Dec-13

Capital Improvement Program	Funding Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516	$105,500,310
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866	5,830,619
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
RAC CFC Funding	2,503,067	2,578,159	2,655,504	2,735,169	2,817,224	13,289,123	17,069,993	42,613,040	72,972,156
Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
Funds Available Current Year	50,408,584	70,665,144	31,672,436	37,233,630	28,987,298	218,967,092	190,601,166	776,255,296	1,185,823,555
Beginning Cash Balance/Funds Carried Over from Prior Year	29,687,415	17,973,026	35,001,503	10,081,317	2,329,156	29,687,415	5,100,363	6,214,060	29,687,415
Funds Used Current Year	(62,122,973)	(53,636,667)	(56,592,622)	(44,985,791)	(26,216,092)	(243,554,144)	(189,487,469)	(777,624,116)	(1,210,665,729)
Funds Carried Over to Next Year	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241	$4,845,241
DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

	Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Escalated Costs
Short Term Projects (2014-2018)											
1	GIS System	$150,000	$150,000					$150,000			$150,000
2	G/L Accounting/Properties Software	500,000	500,000					500,000			500,000
3	Fleet Vehicles	35,000	35,000					35,000			35,000
4	Building Expansion-8122 W Pilot Drive	150,000	150,000					150,000			150,000
5	Aero Area Site Prep	500,000	500,000					500,000			500,000
6	Building Demo - Former ANG Campus	delete	delete					0			0
7	Demo Building 2501	delete	delete					0			0
8	Aeronautical Development	delete	delete					0			0
9	West Site Preliminary Design/Construction	500,000	500,000					500,000			500,000
10	Property Acquisition	1,000,000	1,000,000					1,000,000			1,000,000
11	AIP Matching	1,705,556	1,705,556					1,705,556			1,705,556
12	Perimeter Road Rehab	350,000	350,000					350,000			350,000
13	SRE Equip - non PFC Eligible	100,000	100,000					100,000			100,000
14	Airfield Maint Bldg Remodel	75,000	75,000					75,000			75,000
15	Fleet Vehicles	100,000	100,000					100,000			100,000
16	Street Sweeper	50,000	50,000					50,000			50,000
17	R/W 7-25 Pavement Repairs	delete	delete					0			0
18	Mower Decks	100,000	100,000					100,000			100,000
19	Air Cargo Bldg Upgrades - Envelope & Elec	50,000	50,000					50,000			50,000
20	Building Demo - 2945 S Flint Road	40,000	40,000					40,000			40,000
21	CCTV Upgrades/Expansion	150,000	150,000					150,000			150,000
22	Perimeter Communications Backbone	50,000	50,000					50,000			50,000
23	CCTV Storage Server	50,000	50,000					50,000			50,000
24	Card Reader Proximity Upgrade	150,000	150,000					150,000			150,000
xx	WiFi Infrastructure	200,000	200,000					200,000			200,000
25	UPS Upgrades	125,000	125,000					125,000			125,000

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

Table 8-1

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP PFC TSA STATE VALE

27-Dec-13

Capital Improvement Program	Funding Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516	$105,500,310
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866	5,830,619
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
RAC CFC Funding	2,503,067	2,578,159	2,655,504	2,735,169	2,817,224	13,289,123	17,069,993	42,613,040	72,972,156
Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
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Funds Carried Over to Next Year	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241	$4,845,241
DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

	Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Escalated Costs
26	Strategic ITTerminal Infrastructure Plan	120,000	120,000					120,000			120,000
27	Airport Drive Variable Message Signs	250,000	250,000					250,000			250,000
28	Spotted Road Improvement (non grant)	60,750	60,750					60,750			60,750
29	Parking Enhancements/Improvements	500,000	500,000					500,000			500,000
30	Misc Pavement Project	500,000	500,000					500,000			500,000
31	Airport Drive Landscape	550,000	550,000					550,000			550,000
32	Customer Service Phones - Parking Lots	50,000	50,000					50,000			50,000
33	Replace Shuttle Buses	75,000	75,000					75,000			75,000
34	South Garage 1st Floor Mods	650,000	650,000					650,000			650,000
35	Cell Phone Lot - Phase II	200,000	200,000					200,000			200,000
36	Sidewalk & Ramp Improvements	100,000	100,000					100,000			100,000
37	Signage & Wayfinding Improvements - Roads/Facilities	100,000	100,000					100,000			100,000
38	Parking/GT Operations Building	1,500,000	1,500,000					1,500,000			1,500,000
39	Part 139 Software	delete	delete					0			0
40	ARFF Roof Rehab	100,000	100,000					100,000			100,000
41	New ARFF Furnishings-Non-Eligible	350,000	350,000					350,000			350,000
42	Terminal Entrance Security Improvements	100,000	100,000					100,000			100,000
43	Police Vehicle Replacement	40,000	40,000					40,000			40,000
44	Security Screening Checkpoints Automation	150,000	150,000					150,000			150,000
45	Regional Emergency Radio System Upgrade	100,000	100,000					100,000			100,000
46	PLC Controls for Bridges	250,000	250,000					250,000			250,000
47	Upgrade Elevator Controls	150,000	150,000					150,000			150,000
48	Building System Controls Upgrade	delete	delete					0			0
49	Fleet Vehicles	25,000	25,000					25,000			25,000
50	Utility Vehicles	25,000	25,000					25,000			25,000
xx	Revenue Control System Upgrade	100,000	100,000					100,000			100,000

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Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP PFC TSA STATE VALE

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Capital Improvement Program	Funding Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516	$105,500,310
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866	5,830,619
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
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Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
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Beginning Cash Balance/Funds Carried Over from Prior Year	29,687,415	17,973,026	35,001,503	10,081,317	2,329,156	29,687,415	5,100,363	6,214,060	29,687,415
Funds Used Current Year	(62,122,973)	(53,636,667)	(56,592,622)	(44,985,791)	(26,216,092)	(243,554,144)	(189,487,469)	(777,624,116)	(1,210,665,729)
Funds Carried Over to Next Year	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241	$4,845,241
DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

	Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Escalated Costs
xx	Perimeter Security Fencing Improvements (AIP)	500,000	500,000					500,000			500,000
51	Admin Restroom Upgrade	delete	delete					0			0
52	Concourse Chair Replacement	390,000	390,000					390,000			390,000
53	Auto Door Replacement C Concourse	60,000	60,000					60,000			60,000
54	T/W Re-Configuration (short term)	10,500,000	10,500,000					10,500,000			10,500,000
55	New ARFF Facility	4,000,000	4,000,000					4,000,000			4,000,000
56	VALE Program	delete	delete					0			0
57	FBO-Customs Ramp Rehab	150,000	150,000					150,000			150,000
58	Spotted Road Improvements-AIP Eligible	200,000	200,000					200,000			200,000
59	Taxiway & Ramp Rehab-Felts	1,550,000	1,550,000					1,550,000			1,550,000
60	New Regulator Building-Felts	275,000	275,000					275,000			275,000
61	Rehab Taxilanes/Taxiways-Felts	350,000	350,000					350,000			350,000
62	Terminal Entry Drive Improvements-Eligible-PFC	150,000	150,000					150,000			150,000
63	Terminal Expansion Planning-PFC	1,000,000	1,000,000					1,000,000			1,000,000
64	Terminal Phase I Design-PFC	1,000,000	1,000,000					1,000,000			1,000,000
65	Fuel Farm Upgrades-FFFs	1,600,000	1,600,000					1,600,000			1,600,000
66	New Hangar	24,000,000	24,000,000					24,000,000			24,000,000
67	Spotted Road Improvement (FHW grant)	175,000	175,000					175,000			175,000
68	TSA EDS Replacement Project	200,000	200,000					200,000			200,000
69	Lighting Replacement on T/W G	320,000	320,000					320,000			320,000
70	Parking Lot Lighting Fixture Replacement	250,000	250,000					250,000			250,000
71	Parking & Roadway Improvements-Felts	400,000	400,000					400,000			400,000
	Other Capital-Felts	901,667	901,667					901,667			901,667
	Other Capital-BP	1,975,000	1,975,000					1,975,000			1,975,000
	Total Capital Projects 2014	$62,122,973	$62,122,973	$0	$0	$0	$0	$62,122,973	$0	$0	$62,122,973

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Spokane, Washington

Table 8-1

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP PFC TSA STATE VALE

27-Dec-13

Capital Improvement Program	Funding Schedule								
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	2014	2015	2016	2017	2018	Total	2019-2023	2024-2033	Funding
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TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
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Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
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	Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule								
			Short Term						Mid Term	Long Term	Total Escalated
			2014	2015	2016	2017	2018	Total	2019-2023	2024-2033	Costs
72	GIS System	150,000		150,000				150,000			150,000
73	G/L Accounting/Properties Software	250,000		250,000				250,000			250,000
74	Building Expansion-8122 Pilot Drive	1,200,000		1,200,000				1,200,000			1,200,000
xx	Aeronautical Development	500,000		500,000				500,000			500,000
75	Property Acquisition	1,000,000		1,000,000				1,000,000			1,000,000
76	AIP Matching	950,000		950,000				950,000			950,000
77	Perimeter Road Rehab	250,000		250,000				250,000			250,000
78	SRE Equip - non PFC Eligible	150,000		150,000				150,000			150,000
79	Airfield Maint Bldg Remodel	delete		delete				0			0
80	Flusher Truck	150,000		150,000				150,000			150,000
81	Paint Removal Equipment	450,000		450,000				450,000			450,000
82	Airstair	300,000		300,000				300,000			300,000
83	Air Cargo Bldg Upgrades - Envelope & Elec	50,000		50,000				50,000			50,000
84	CCTV Upgrades/Expansion	150,000		150,000				150,000			150,000
85	Perimeter Communications Backbone	500,000		500,000				500,000			500,000
86	CCTV Storage Server	500,000		500,000				500,000			500,000
87	Card Reader Expansion/Upgrade	100,000		100,000				100,000			100,000
88	Shared Use	200,000		200,000				200,000			200,000
89	FIDS/Paging Upgrade	100,000		100,000				100,000			100,000
90	Spotted Road Improvement (non grant)	270,000		270,000				270,000			270,000
91	Parking Enhancements/Improvements	500,000		500,000				500,000			500,000
92	Misc Pavement Project	500,000		500,000				500,000			500,000
93	Airport Drive Landscape	300,000		300,000				300,000			300,000
94	Customer Service Phones - Parking Lots	50,000		50,000				50,000			50,000
95	Sidewalk & Ramp Improvements	100,000		100,000				100,000			100,000
96	Signage & Wayfinding Improvements - Roads/Facilities	500,000		500,000				500,000			500,000
97	Parking/GT Operations Building	500,000		500,000				500,000			500,000
98	Revenue Control System Upgrade	delete		delete				0			0

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Spokane, Washington

GEGMP2013_4.123

Table 8-1

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP PFC TSA STATE VALE

27-Dec-13

Capital Improvement Program	Funding Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516	$105,500,310
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866	5,830,619
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
RAC CFC Funding	2,503,067	2,578,159	2,655,504	2,735,169	2,817,224	13,289,123	17,069,993	42,613,040	72,972,156
Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
Funds Available Current Year	50,408,584	70,665,144	31,672,436	37,233,630	28,987,298	218,967,092	190,601,166	776,255,296	1,185,823,555
Beginning Cash Balance/Funds Carried Over from Prior Year	29,687,415	17,973,026	35,001,503	10,081,317	2,329,156	29,687,415	5,100,363	6,214,060	29,687,415
Funds Used Current Year	(62,122,973)	(53,636,667)	(56,592,622)	(44,985,791)	(26,216,092)	(243,554,144)	(189,487,469)	(777,624,116)	(1,210,665,729)
Funds Carried Over to Next Year	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241	$4,845,241
DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

	Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Escalated Costs
99	Fleet Vehicles	40,000		40,000				40,000			40,000
100	Continuous Friction Measurement Vehicle	250,000		250,000				250,000			250,000
101	Fleet Vehicles	45,000		45,000				45,000			45,000
102	Terminal Entrance Security Improvements	250,000		250,000				250,000			250,000
103	PLC Controls for Bridges	250,000		250,000				250,000			250,000
104	Upgrade Elevator Controls	150,000		150,000				150,000			150,000
105	Building System Controls Upgrade	delete		delete				0			0
106	Concourse C HVAC Replacement	50,000		50,000				50,000			50,000
xx	Security Screening Checkpoints Automation	1,500,000		1,500,000				1,500,000			1,500,000
107	Chiller for Concourse B	80,000		80,000				80,000			80,000
108	T/W Re-Configuration (short term)	4,900,000		4,900,000				4,900,000			4,900,000
109	VALE Program	delete		delete				0			0
110	FBO-Customs Ramp Rehab	1,200,000		1,200,000				1,200,000			1,200,000
111	Spotted Road Improvements-AIP Eligible	1,000,000		1,000,000				1,000,000			1,000,000
112	Glycol Management	1,450,000		1,450,000				1,450,000			1,450,000
113	Perimeter Security Fencing Improvements	delete		delete				0			0
114	Rehab Taxilanes/Taxiways-Felts	1,500,000		1,500,000				1,500,000			1,500,000
115	Terminal Entry Drive Improvements-Eligible-PFC	1,500,000		1,500,000				1,500,000			1,500,000
116	Terminal Phase I Design-PFC	2,500,000		2,500,000				2,500,000			2,500,000
117	Terminal Construction Phase 1-PFC	15,000,000		15,000,000				15,000,000			15,000,000
118	Spotted Road Improvement (FHW grant)	875,000		875,000				875,000			875,000
119	TSA EDS Replacement Project	5,400,000		5,400,000				5,400,000			5,400,000
120	Parking Lot Lighting Fixture Replacement	250,000		250,000				250,000			250,000
121	Parking & Roadway Improvements-Felts	2,000,000		2,000,000				2,000,000			2,000,000
	Other Capital-Felts	1,121,667		1,121,667				1,121,667			1,121,667
	Other Capital-BP	430,000		430,000				430,000			430,000
	Total Capital Projects 2015	$51,411,667	$0	$51,411,667	$0	$0	$0	$51,411,667	$0	$0	$51,411,667

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP | PFC | TSA | STATE | VALE

27-Dec-13

Capital Improvement Program	Funding Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516	$105,500,310
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866	5,830,619
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
RAC CFC Funding	2,503,067	2,578,159	2,655,504	2,735,169	2,817,224	13,289,123	17,069,993	42,613,040	72,972,156
Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
Funds Available Current Year	50,408,584	70,665,144	31,672,436	37,233,630	28,987,298	218,967,092	190,601,166	776,255,296	1,185,823,555
Beginning Cash Balance/Funds Carried Over from Prior Year	29,687,415	17,973,026	35,001,503	10,081,317	2,329,156	29,687,415	5,100,363	6,214,060	29,687,415
Funds Used Current Year	(62,122,973)	(53,636,667)	(56,592,622)	(44,985,791)	(26,216,092)	(243,554,144)	(189,487,469)	(777,624,116)	(1,210,665,729)
Funds Carried Over to Next Year	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241	$4,845,241
DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

	Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Escalated Costs
122	GIS System	50,000			50,000			50,000			50,000
123	Aero Area Site Prep	1,000,000			1,000,000			1,000,000			1,000,000
124	West Side Prep Construction	5,000,000			5,000,000			5,000,000			5,000,000
125	Property Acquisition	1,000,000			1,000,000			1,000,000			1,000,000
126	AIP Matching	666,667			666,667			666,667			666,667
127	Fleet Vehicles	100,000			100,000			100,000			100,000
128	Perimeter Road Extension (Term Ramp to ASR-9)	500,000			500,000			500,000			500,000
129	Taxiway C Extension	1,000,000			1,000,000			1,000,000			1,000,000
130	Air Cargo Bldg Upgrades - Envelope & Elec	50,000			50,000			50,000			50,000
131	CCTV Upgrades/Expansion	100,000			100,000			100,000			100,000
132	Perimeter Communications Backbone	100,000			100,000			100,000			100,000
133	Card Reader Expansion/Upgrade	1,000,000			1,000,000			1,000,000			1,000,000
134	Shared Use	2,000,000			2,000,000			2,000,000			2,000,000
135	FIDS/Paging Upgrade	1,000,000			1,000,000			1,000,000			1,000,000
136	Spotted Road Improvement (non grant)	270,000			270,000			270,000			270,000
137	Parking Enhancements/Improvements	500,000			500,000			500,000			500,000
138	Misc Pavement Project	500,000			500,000			500,000			500,000
139	Replace Shuttle Buses	75,000			75,000			75,000			75,000
xx	Terminal Entrance Security Improvements	150,000			150,000			150,000			150,000
xx	VALE Program	1,000,000			1,000,000			1,000,000			1,000,000
140	Police Vehicle Replacement	40,000			40,000			40,000			40,000
141	Perimeter Intrusion Detection	1,250,000			1,250,000			1,250,000			1,250,000
142	PLC Controls for Bridges	250,000			250,000			250,000			250,000
143	Fleet Vehicles	65,000			65,000			65,000			65,000
144	Concourse C HVAC Replacement	5,000,000			5,000,000			5,000,000			5,000,000
145	Glycol Management	4,000,000			4,000,000			4,000,000			4,000,000
146	Perimeter Security Fencing Improvements	delete			delete			0			0
147	Rehab Taxilanes/Taxiways-Felts	1,150,000			1,150,000			1,150,000			1,150,000
148	Master Plan-Felts	150,000			150,000			150,000			150,000
149	Runway 7-25 Rehab	1,000,000			1,000,000			1,000,000			1,000,000
150	Terminal Construction Phase 1	20,000,000			20,000,000			20,000,000			20,000,000
151	Spotted Road Improvement (FHW grant)	1,750,000			1,750,000			1,750,000			1,750,000
152	Parking & Roadway Improvements-Felts	2,000,000			2,000,000			2,000,000			2,000,000
	Other Capital-Felts	1,219,444			1,219,444			1,219,444			1,219,444
	Other Capital-BP	465,000			465,000			465,000			465,000
	Total Capital Projects 2016	$54,401,111	$0	$0	$54,401,111	$0	$0	$54,401,111	$0	$0	$54,401,111

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

Table 8-1

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP PFC TSA STATE VALE

27-Dec-13

Capital Improvement Program	Funding Schedule								
	Short Term						Mid Term	Long Term	Total
	2014	2015	2016	2017	2018	Total	2019-2023	2024-2033	Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516	$105,500,310
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866	5,830,619
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
RAC CFC Funding	2,503,067	2,578,159	2,655,504	2,735,169	2,817,224	13,289,123	17,069,993	42,613,040	72,972,156
Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
Funds Available Current Year	50,408,584	70,665,144	31,672,436	37,233,630	28,987,298	218,967,092	190,601,166	776,255,296	1,185,823,555
Beginning Cash Balance/Funds Carried Over from Prior Year	29,687,415	17,973,026	35,001,503	10,081,317	2,329,156	29,687,415	5,100,363	6,214,060	29,687,415
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DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

	Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule								
			Short Term						Mid Term	Long Term	Total Escalated
			2014	2015	2016	2017	2018	Total	2019-2023	2024-2033	Costs
153	GIS System	50,000				50,000		50,000			50,000
154	Fleet Vehicles	35,000				35,000		35,000			35,000
155	West Site Prep Construction	5,000,000				5,000,000		5,000,000			5,000,000
156	Property Acquisition	1,000,000				1,000,000		1,000,000			1,000,000
157	AIP Matching	761,111				761,111		761,111			761,111
158	Perimeter Road Rehab	250,000				250,000		250,000			250,000
159	Taxiway C Extension	9,000,000				9,000,000		9,000,000			9,000,000
160	CCTV Upgrades/Expansion	100,000				100,000		100,000			100,000
161	Perimeter Communications Backbone	100,000				100,000		100,000			100,000
162	Spotted Road Improvement (non grant)	270,000				270,000		270,000			270,000
163	Parking Enhancements/Improvements	500,000				500,000		500,000			500,000
164	Misc Pavement Project	500,000				500,000		500,000			500,000
165	Fleet Vehicles	40,000				40,000		40,000			40,000
166	Utility Vehicles	25,000				25,000		25,000			25,000
167	VALE Program	1,000,000				1,000,000		1,000,000			1,000,000
168	Glycol Management	4,000,000				4,000,000		4,000,000			4,000,000
169	T/W Re-Configuration (mid term)	1,000,000				1,000,000		1,000,000			1,000,000
170	Replace Class 5 ARFF Vehicle	850,000				850,000		850,000			850,000
171	Master Plan-Felts	150,000				150,000		150,000			150,000
172	New Taxilanes-Felts	150,000				150,000		150,000			150,000
173	Terminal Construction Phase 1	15,000,000				15,000,000		15,000,000			15,000,000
174	Spotted Road Improvement (FHW grant)	1,750,000				1,750,000		1,750,000			1,750,000
	Other Capital-Felts	1,033,333				1,033,333		1,033,333			1,033,333
	Other Capital-BP	265,000				265,000		265,000			265,000
	Total Capital Projects 2017	$42,829,444	$0	$0	$0	$42,829,444	$0	$42,829,444	$0	$0	$42,829,444

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Table 8-1

Master Plan - Financial Implementation Analysis
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TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
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Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
Funds Available Current Year	50,408,584	70,665,144	31,672,436	37,233,630	28,987,298	218,967,092	190,601,166	776,255,296	1,185,823,555
Beginning Cash Balance/Funds Carried Over from Prior Year	29,687,415	17,973,026	35,001,503	10,081,317	2,329,156	29,687,415	5,100,363	6,214,060	29,687,415
Funds Used Current Year	(62,122,973)	(53,636,667)	(56,592,622)	(44,985,791)	(26,216,092)	(243,554,144)	(189,487,469)	(777,624,116)	(1,210,665,729)
Funds Carried Over to Next Year	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241	$4,845,241
DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

	Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Escalated Costs
175	Aero Area Site Prep	1,000,000					1,000,000	1,000,000			1,000,000
176	Property Acquisition	1,000,000					1,000,000	1,000,000			1,000,000
177	AIP Matching	1,000,000					1,000,000	1,000,000			1,000,000
178	Fleet Vehicles	100,000					100,000	100,000			100,000
179	CCTV Upgrades/Expansion	100,000					100,000	100,000			100,000
180	Perimeter Communications Backbone	100,000					100,000	100,000			100,000
181	Spotted Road Improvement (non grant)	270,000					270,000	270,000			270,000
182	Parking Enhancements/Improvements	500,000					500,000	500,000			500,000
183	Misc Pavement Project	500,000					500,000	500,000			500,000
184	Customer Service Phones - Parking Lots	50,000					50,000	50,000			50,000
185	Replace Shuttle Buses	75,000					75,000	75,000			75,000
xx	Revenue Control System Upgrade	500,000					500,000	500,000			500,000
186	Fleet Vehicles	45,000					45,000	45,000			45,000
187	Police Vehicle Replacement	40,000					40,000	40,000			40,000
188	Fleet Vehicles	40,000					40,000	40,000			40,000
189	VALE Program	1,000,000					1,000,000	1,000,000			1,000,000
190	Glycol Management	3,000,000					3,000,000	3,000,000			3,000,000
191	T/W Re-Configuration (mid term)	5,000,000					5,000,000	5,000,000			5,000,000
192	New Taxilanes-Felts	1,500,000					1,500,000	1,500,000			1,500,000
193	Terminal Construction Phase 1	5,000,000					5,000,000	5,000,000			5,000,000
194	Spotted Road Improvement (FHW grant)	1,750,000					1,750,000	1,750,000			1,750,000
	Other Capital-Felts	1,216,667					1,216,667	1,216,667			1,216,667
	Other Capital-BP	310,000					310,000	310,000			310,000
	Total Capital Projects 2018	$24,096,667	$0	$0	$0	$0	$24,096,667	$24,096,667	$0	$0	$24,096,667
	Total Short Term Project Costs Before Financing	$234,861,862	$62,122,973	$51,411,667	$54,401,111	$42,829,444	$24,096,667	$234,861,862	$0	$0	$234,861,862
	Financing Costs for Debt Serviced with PFCs	-	0	2,225,000	2,191,511	2,156,347	2,119,425	8,692,282	0	0	8,692,282
	Total Short Term Project Costs	$234,861,862	$62,122,973	$53,636,667	$56,592,622	$44,985,791	$26,216,092	$243,554,144	$0	$0	$243,554,144

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

Table 8-1

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP PFC TSA STATE VALE

27-Dec-13

Capital Improvement Program	Funding Schedule								
	Short Term						Mid Term	Long Term	Total
	2014	2015	2016	2017	2018	Total	2019-2023	2024-2033	Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516	$105,500,310
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866	5,830,619
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
RAC CFC Funding	2,503,067	2,578,159	2,655,504	2,735,169	2,817,224	13,289,123	17,069,993	42,613,040	72,972,156
Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
Funds Available Current Year	50,408,584	70,665,144	31,672,436	37,233,630	28,987,298	218,967,092	190,601,166	776,255,296	1,185,823,555
Beginning Cash Balance/Funds Carried Over from Prior Year	29,687,415	17,973,026	35,001,503	10,081,317	2,329,156	29,687,415	5,100,363	6,214,060	29,687,415
Funds Used Current Year	(62,122,973)	(53,636,667)	(56,592,622)	(44,985,791)	(26,216,092)	(243,554,144)	(189,487,469)	(777,624,116)	(1,210,665,729)
Funds Carried Over to Next Year	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241	$4,845,241
DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule								
		Short Term						Mid Term	Long Term	Total Escalated
		2014	2015	2016	2017	2018	Total	2019-2023	2024-2033	Costs
Mid Term Projects (2019-2023)										
194 Taxiway Reconfiguration-Phase 3a (Construction)	$11,250,000						$0	$13,633,096		$13,633,096
195 Hayford Road Realignment	11,043,000						0	13,382,247		13,382,247
196 Equipment	3,375,000						0	4,089,929		4,089,929
197 Terminal Phase 2 (Construction)	30,000,000						0	36,354,922		36,354,922
198 Relocate and Expand US Customs	3,220,000						0	3,902,095		3,902,095
199 Property Acquisition	5,000,000						0	6,059,154		6,059,154
200 East Apron Phase 1 (Construction)	6,100,000						0	7,392,167		7,392,167
201 New Air Cargo Building	4,000,000						0	4,847,323		4,847,323
202 Construct Glycol Recovery System	4,500,000						0	5,453,238		5,453,238
203 Surface Lot Expansion Phase 1	2,239,000						0	2,713,289		2,713,289
204 Garage Assembly Area	3,609,000						0	4,373,497		4,373,497
205 Parking Lot Covered Walkway & Moving Sidewalks	14,039,000						0	17,012,892		17,012,892
206 Garage Pedestrian Bridge Expansion	10,030,000						0	12,154,662		12,154,662
207 Surface Lot Entrance Plaza	735,000						0	890,696		890,696
208 Parking Exit Plaza	869,000						0	1,053,081		1,053,081
209 Employee Surface Lot	843,000						0	1,021,573		1,021,573
210 Inbound Road W/O Flint	1,369,000						0	1,658,996		1,658,996
211 Concourse Road	3,414,000						0	4,137,190		4,137,190
212 Outbound Road	1,498,000						0	1,815,322		1,815,322
213 Runway 7-25 Overlay	5,000,000						0	6,059,154		6,059,154
214 Runway 7-25 Approach Upgrades	1,000,000						0	1,211,831		1,211,831
Other Capital-SIA	18,750,000						0	22,721,826		22,721,826
Other Capital-Felts	5,000,000						0	6,059,154		6,059,154
Other Capital-BP	1,250,000						0	1,514,788		1,514,788
Total Mid Term Project Costs Before Financing	$148,133,000	$0	$0	$0	$0	$0	$0	$179,512,121	$0	$179,512,121
Financing Costs for Debt Serviced with PFCs	-	0	0	0	0	0	0	9,975,348	0	9,975,348
Total Mid Term Project Costs	$148,133,000	$0	$0	$0	$0	$0	$0	$189,487,469	$0	$189,487,469

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

AIP PFC TSA STATE VALE

27-Dec-13

Capital Improvement Program	Funding Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516	$105,500,310
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866	5,830,619
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297	59,635,786
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0	5,600,000
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0	5,696,000
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0	2,700,000
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671	193,677,760
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0	(6,150,000)
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000		0	0	0	24,000,000	0	0	24,000,000
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)	(46,837,033)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0	44,500,000
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)	(44,500,000)
RAC CFC Funding	2,503,067	2,578,159	2,655,504	2,735,169	2,817,224	13,289,123	17,069,993	42,613,040	72,972,156
Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0	4,847,323
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705	347,180,370
Net Operating Cash Flow	4,737,939	6,668,753	7,116,084	9,028,531	9,957,507	37,508,815	77,960,411	295,701,038	411,170,264
Funds Available Current Year	50,408,584	70,665,144	31,672,436	37,233,630	28,987,298	218,967,092	190,601,166	776,255,296	1,185,823,555
Beginning Cash Balance/Funds Carried Over from Prior Year	29,687,415	17,973,026	35,001,503	10,081,317	2,329,156	29,687,415	5,100,363	6,214,060	29,687,415
Funds Used Current Year	(62,122,973)	(53,636,667)	(56,592,622)	(44,985,791)	(26,216,092)	(243,554,144)	(189,487,469)	(777,624,116)	(1,210,665,729)
Funds Carried Over to Next Year	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241	$4,845,241
DSC Estimate (including existing debt service) >>		2.05x	2.06x	2.68x	2.87x				

Capital Project Description	2014 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033	Total Escalated Costs
Long Term Projects (2024-2033)										
215 Taxiway Reconfiguration	$22,500,000						$0		$34,033,269	$34,033,269
216 Decommission Runway 7-25	2,250,000						0		3,403,327	3,403,327
217 Replace Class V ARFF Vehicle	3,375,000						0		5,104,990	5,104,990
218 Runway 3R-21L Extension (1,000' + Taxiways)	30,429,000						0		46,026,593	46,026,593
219 Terminal Phase 3 (Construction)	60,000,000						0		90,755,383	90,755,383
220 Property Acquisition	10,000,000						0		15,125,897	15,125,897
221 Deicing Apron Expansion	6,100,000						0		9,226,797	9,226,797
222 Parking Garage Expansion	50,000,000						0		75,629,486	75,629,486
223 Parking Garage Entrance Plaza	535,000						0		809,236	809,236
224 Garage Pedestrian Bridge Expansion	10,030,000						0		15,171,275	15,171,275
225 Surface Lot Expansion	2,239,000						0		3,386,688	3,386,688
226 Parking Area Circulation Road	1,189,000						0		1,798,469	1,798,469
227 Interchanges at Spotted Road	16,044,000						0		24,267,990	24,267,990
228 Inbound Road E/O Flint	2,496,000						0		3,775,424	3,775,424
229 Interchanges at Flint Road	616,000						0		931,755	931,755
230 East Industrial Park Roadway	3,194,000						0		4,831,212	4,831,212
231 Future Runway 3L-21R Planning	1,057,500						0		1,599,564	1,599,564
232 EA/EIS New Runway 3L-21R	4,500,000						0		6,806,654	6,806,654
233 Mitigation New Runway 3L-21R	11,250,000						0		17,016,634	17,016,634
234 New Runway 3L-21R (Design)	16,380,000						0		24,776,220	24,776,220
235 New Runway 3L-21R (Construction)	40,950,000						0		61,940,549	61,940,549
236 New Runway 3L-21R (Construction)	122,850,000						0		185,821,648	185,821,648
237 Electric Avenue Relocation	4,214,000						0		6,374,053	6,374,053
238 Replace/Relocate ATCT	26,250,000						0		39,705,480	39,705,480
Other Capital-SIA	37,500,000						0		56,722,115	56,722,115
Other Capital-Felts	10,000,000						0		15,125,897	15,125,897
Other Capital-BP	2,500,000						0		3,781,474	3,781,474
Total Long Term Project Costs Before Financing	$498,448,500	$0	$0	$0	$0	$0	$0	$0	$753,948,079	$753,948,079
Financing Costs for Debt Serviced with PFCs	-	0	0	0	0	0	0	0	23,676,036	23,676,036
Total Long Term Project Costs	$498,448,500	$0	$0	$0	$0	$0	$0	$0	$777,624,116	$777,624,116
Total Project Costs	$881,443,362	$62,122,973	$53,636,667	$56,592,622	$44,985,791	$26,216,092	$243,554,144	$189,487,469	$777,624,116	$1,210,665,729

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

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Table 8-2

Master Plan - Financial Implementation Analysis
Projected Capital Funding Sources

27-Dec-13

	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding (ENP+Cargo)	AIP Discretionary Funding	Total AIP Funding	TSA Funding	State Grants	VALE Grants	Passenger Facility Charges (Debt)	Passenger Facility Charges (PAYG)	Private 3rd Party Funding	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
Short Term Projects (2014-2018)														
1	GIS System	$150,000			$0								$150,000	$150,000
2	G/L Accounting/Properties Software	500,000			0								500,000	500,000
3	Fleet Vehicles	35,000			0								35,000	35,000
4	Building Expansion-8122 W Pilot Drive	150,000			0								150,000	150,000
5	Aero Area Site Prep	500,000			0								500,000	500,000
6	Building Demo - Former ANG Campus	0			0								0	0
7	Demo Building 2501	0			0								0	0
8	Aeronautical Development	0			0								0	0
9	West Site Preliminary Design/Construction	500,000			0								500,000	500,000
10	Property Acquisition	1,000,000			0								1,000,000	1,000,000
11	AIP Matching	1,705,556			0								1,705,556	1,705,556
12	Perimeter Road Rehab	350,000			0								350,000	350,000
13	SRE Equip - non PFC Eligible	100,000			0								100,000	100,000
14	Airfield Maint Bldg Remodel	75,000			0								75,000	75,000
15	Fleet Vehicles	100,000			0								100,000	100,000
16	Street Sweeper	50,000			0								50,000	50,000
17	R/W 7-25 Pavement Repairs	0			0								0	0
18	Mower Decks	100,000			0								100,000	100,000
19	Air Cargo Bldg Upgrades - Envelope & Elec	50,000			0								50,000	50,000
20	Building Demo - 2945 S Flint Road	40,000			0								40,000	40,000
21	CCTV Upgrades/Expansion	150,000			0								150,000	150,000
22	Perimeter Communications Backbone	50,000			0								50,000	50,000
23	CCTV Storage Server	50,000			0								50,000	50,000
24	Card Reader Proximity Upgrade	150,000			0								150,000	150,000
xx	WiFi Infrastructure	200,000			0								200,000	200,000
25	UPS Upgrades	125,000			0								125,000	125,000
26	Strategic ITTerminal Infrastructure Plan	120,000			0								120,000	120,000
27	Airport Drive Variable Message Signs	250,000			0								250,000	250,000
28	Spotted Road Improvement (non grant)	60,750			0								60,750	60,750
29	Parking Enhancements/Improvements	500,000			0								500,000	500,000
30	Misc Pavement Project	500,000			0								500,000	500,000
31	Airport Drive Landscape	550,000			0								550,000	550,000
32	Customer Service Phones - Parking Lots	50,000			0								50,000	50,000
33	Replace Shuttle Buses	75,000			0								75,000	75,000
34	South Garage 1st Floor Mods	650,000			0								650,000	650,000
35	Cell Phone Lot - Phase II	200,000			0								200,000	200,000
36	Sidewalk & Ramp Improvements	100,000			0								100,000	100,000

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

Table 8-2

Master Plan - Financial Implementation Analysis
Projected Capital Funding Sources

27-Dec-13

	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding (ENP+Cargo)	AIP Discretionary Funding	Total AIP Funding	TSA Funding	State Grants	VALE Grants	Passenger Facility Charges (Debt)	Passenger Facility Charges (PAYG)	Private 3rd Party Funding	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
37	Signage & Wayfinding Improvements - Roads/Facilities	100,000			0								100,000	100,000
38	Parking/GT Operations Building	1,500,000			0								1,500,000	1,500,000
39	Part 139 Software	0			0								0	0
40	ARFF Roof Rehab	100,000			0								100,000	100,000
41	New ARFF Furnishings-Non-Eligible	350,000			0								350,000	350,000
42	Terminal Entrance Security Improvements	100,000			0								100,000	100,000
43	Police Vehicle Replacement	40,000			0								40,000	40,000
44	Security Screening Checkpoints Automation	150,000			0								150,000	150,000
45	Regional Emergency Radio System Upgrade	100,000			0								100,000	100,000
46	PLC Controls for Bridges	250,000			0								250,000	250,000
47	Upgrade Elevator Controls	150,000			0								150,000	150,000
48	Building System Controls Upgrade	0			0								0	0
49	Fleet Vehicles	25,000			0								25,000	25,000
50	Utility Vehicles	25,000			0								25,000	25,000
xx	Revenue Control System Upgrade	100,000			0								100,000	100,000
xx	Perimeter Security Fencing Improvements (AIP)	500,000	450,000		450,000					50,000			0	500,000
51	Admin Restroom Upgrade	0			0								0	0
52	Concourse Chair Replacement	390,000			0								390,000	390,000
53	Auto Door Replacement C Concourse	60,000			0								60,000	60,000
54	T/W Re-Configuration (short term)	10,500,000	2,010,773	7,439,227	9,450,000								1,050,000	10,500,000
55	New ARFF Facility	4,000,000		3,600,000	3,600,000								400,000	4,000,000
56	VALE Program	0			0			0					0	0
57	FBO-Customs Ramp Rehab	150,000	135,000		135,000								15,000	150,000
58	Spotted Road Improvements-AIP Eligible	200,000	180,000		180,000								20,000	200,000
59	Taxiway & Ramp Rehab-Felts	1,550,000	1,395,000		1,395,000								155,000	1,550,000
60	New Regulator Building-Felts	275,000	247,500		247,500								27,500	275,000
61	Rehab Taxilanes/Taxiways-Felts	350,000	315,000		315,000								35,000	350,000
62	Terminal Entry Drive Improvements-Eligible-PFC	150,000			0					150,000			0	150,000
63	Terminal Expansion Planning-PFC	1,000,000			0					1,000,000			0	1,000,000
64	Terminal Phase I Design-PFC	1,000,000			0					1,000,000			0	1,000,000
65	Fuel Farm Upgrades-FFFs	1,600,000			0								1,600,000	1,600,000
66	New Hangar	24,000,000			0								24,000,000	24,000,000
67	Spotted Road Improvement (FHW grant)	175,000			0		140,000						35,000	175,000
68	TSA EDS Replacement Project	200,000			0	200,000							0	200,000
69	Lighting Replacement on T/W G	320,000			0		256,000						64,000	320,000
70	Parking Lot Lighting Fixture Replacement	250,000			0		200,000						50,000	250,000
71	Parking & Roadway Improvements-Felts	400,000			0								400,000	400,000
	Other Capital-Felts	901,667			0								901,667	901,667
	Other Capital-BP	1,975,000			0								1,975,000	1,975,000
	Totals for 2014	$62,122,973	$4,733,273	$11,039,227	$15,772,500	$200,000	$596,000	$0	$0	$2,200,000	$0	$0	$43,354,473	$62,122,973

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding (ENP+Cargo)	AIP Discretionary Funding	Total AIP Funding	TSA Funding	State Grants	VALE Grants	Passenger Facility Charges (Debt)	Passenger Facility Charges (PAYG)	Private 3rd Party Funding	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
72	GIS System	150,000			0								150,000	150,000
73	G/L Accounting/Properties Software	250,000			0								250,000	250,000
74	Building Expansion-8122 Pilot Drive	1,200,000			0								1,200,000	1,200,000
xx	Aeronautical Development	500,000			0								500,000	500,000
75	Property Acquisition	1,000,000			0								1,000,000	1,000,000
76	AIP Matching	950,000			0								950,000	950,000
77	Perimeter Road Rehab	250,000			0								250,000	250,000
78	SRE Equip - non PFC Eligible	150,000			0								150,000	150,000
79	Airfield Maint Bldg Remodel	0			0								0	0
80	Flusher Truck	150,000			0								150,000	150,000
81	Paint Removal Equipment	450,000			0								450,000	450,000
82	Airstair	300,000			0								300,000	300,000
83	Air Cargo Bldg Upgrades - Envelope & Elec	50,000			0								50,000	50,000
84	CCTV Upgrades/Expansion	150,000			0								150,000	150,000
85	Perimeter Communications Backbone	500,000			0								500,000	500,000
86	CCTV Storage Server	500,000			0								500,000	500,000
87	Card Reader Expansion/Upgrade	100,000			0								100,000	100,000
88	Shared Use	200,000			0								200,000	200,000
89	FIDS/Paging Upgrade	100,000			0								100,000	100,000
90	Spotted Road Improvement (non grant)	270,000			0								270,000	270,000
91	Parking Enhancements/Improvements	500,000			0								500,000	500,000
92	Misc Pavement Project	500,000			0								500,000	500,000
93	Airport Drive Landscape	300,000			0								300,000	300,000
94	Customer Service Phones - Parking Lots	50,000			0								50,000	50,000
95	Sidewalk & Ramp Improvements	100,000			0								100,000	100,000
96	Signage & Wayfinding Improvements - Roads/Facilities	500,000			0								500,000	500,000
97	Parking/GT Operations Building	500,000			0								500,000	500,000
98	Revenue Control System Upgrade	0			0								0	0

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding (ENP+Cargo)	AIP Discretionary Funding	Total AIP Funding	TSA Funding	State Grants	VALE Grants	Passenger Facility Charges (Debt)	Passenger Facility Charges (PAYG)	Private 3rd Party Funding	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
99	Fleet Vehicles	40,000			0								40,000	40,000
100	Continuous Friction Measurement Vehicle	250,000			0								250,000	250,000
101	Fleet Vehicles	45,000			0								45,000	45,000
102	Terminal Entrance Security Improvements	250,000			0								250,000	250,000
103	PLC Controls for Bridges	250,000			0								250,000	250,000
104	Upgrade Elevator Controls	150,000			0								150,000	150,000
105	Building System Controls Upgrade	0			0								0	0
106	Concourse C HVAC Replacement	50,000			0								50,000	50,000
xx	Security Screening Checkpoints Automation	1,500,000			0								1,500,000	1,500,000
107	Chiller for Concourse B	80,000			0								80,000	80,000
108	T/W Re-Configuration (short term)	4,900,000	167,483	4,242,517	4,410,000								490,000	4,900,000
109	VALE Program	0			0			0					0	0
110	FBO-Customs Ramp Rehab	1,200,000	1,080,000	0	1,080,000								120,000	1,200,000
111	Spotted Road Improvements-AIP Eligible	1,000,000	900,000	0	900,000								100,000	1,000,000
112	Glycol Management	1,450,000	1,305,000	0	1,305,000								145,000	1,450,000
113	Perimeter Security Fencing Improvements	0	0	0	0								0	0
114	Rehab Taxilanes/Taxiways-Felts	1,500,000	1,350,000	0	1,350,000								150,000	1,500,000
115	Terminal Entry Drive Improvements-Eligible-PFC	1,500,000			0					1,500,000			0	1,500,000
116	Terminal Phase I Design-PFC	2,500,000			0				2,500,000	0			0	2,500,000
117	Terminal Construction Phase 1-PFC	15,000,000			0				15,000,000				0	15,000,000
118	Spotted Road Improvement (FHW grant)	875,000			0		700,000						175,000	875,000
119	TSA EDS Replacement Project	5,400,000			0	5,400,000							0	5,400,000
120	Parking Lot Lighting Fixture Replacement	250,000			0		200,000						50,000	250,000
121	Parking & Roadway Improvements-Felts	2,000,000			0								2,000,000	2,000,000
	Other Capital-Felts	1,121,667			0								1,121,667	1,121,667
	Other Capital-BP	430,000			0								430,000	430,000
	Totals for 2015	$51,411,667	$4,802,483	$4,242,517	$9,045,000	$5,400,000	$900,000	$0	$17,500,000	$1,500,000	$0	$0	$17,066,667	$51,411,667

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122	GIS System	50,000			0								50,000	50,000
123	Aero Area Site Prep	1,000,000			0								1,000,000	1,000,000
124	West Side Prep Construction	5,000,000			0								5,000,000	5,000,000
125	Property Acquisition	1,000,000			0								1,000,000	1,000,000
126	AIP Matching	666,667			0								666,667	666,667
127	Fleet Vehicles	100,000			0								100,000	100,000
128	Perimeter Road Extension (Term Ramp to ASR-9)	500,000			0								500,000	500,000
129	Taxiway C Extension	1,000,000			0								1,000,000	1,000,000
130	Air Cargo Bldg Upgrades - Envelope & Elec	50,000			0								50,000	50,000
131	CCTV Upgrades/Expansion	100,000			0								100,000	100,000
132	Perimeter Communications Backbone	100,000			0								100,000	100,000
133	Card Reader Expansion/Upgrade	1,000,000			0								1,000,000	1,000,000
134	Shared Use	2,000,000			0								2,000,000	2,000,000
135	FIDS/Paging Upgrade	1,000,000			0								1,000,000	1,000,000
136	Spotted Road Improvement (non grant)	270,000			0								270,000	270,000
137	Parking Enhancements/Improvements	500,000			0								500,000	500,000
138	Misc Pavement Project	500,000			0							500,000	0	500,000
139	Replace Shuttle Buses	75,000			0								75,000	75,000
xx	Terminal Entrance Security Improvements	150,000			0								150,000	150,000
xx	VALE Program	1,000,000			0			900,000					100,000	1,000,000
140	Police Vehicle Replacement	40,000			0							40,000	0	40,000
141	Perimeter Intrusion Detection	1,250,000			0							1,250,000	0	1,250,000
142	PLC Controls for Bridges	250,000			0							250,000	0	250,000
143	Fleet Vehicles	65,000			0							65,000	0	65,000
144	Concourse C HVAC Replacement	5,000,000			0							5,000,000	0	5,000,000
145	Glycol Management	4,000,000	2,804,530	795,470	3,600,000					400,000			0	4,000,000
146	Perimeter Security Fencing Improvements	0	0	0	0								0	0
147	Rehab Taxilanes/Taxiways-Felts	1,150,000	1,035,000	0	1,035,000								115,000	1,150,000
148	Master Plan-Felts	150,000	135,000	0	135,000								15,000	150,000
149	Runway 7-25 Rehab	1,000,000	900,000	0	900,000								100,000	1,000,000
150	Terminal Construction Phase 1	20,000,000			0				16,000,000	4,000,000			0	20,000,000
151	Spotted Road Improvement (FHW grant)	1,750,000			0		1,400,000						350,000	1,750,000
152	Parking & Roadway Improvements-Felts	2,000,000			0							2,000,000	0	2,000,000
	Other Capital-Felts	1,219,444			0								1,219,444	1,219,444
	Other Capital-BP	465,000			0								465,000	465,000
	Totals for 2016	$54,401,111	$4,874,530	$795,470	$5,670,000	$0	$1,400,000	$900,000	$16,000,000	$4,400,000	$0	$9,105,000	$16,926,111	$54,401,111

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153	GIS System	50,000			0								50,000	50,000
154	Fleet Vehicles	35,000			0								35,000	35,000
155	West Site Prep Construction	5,000,000			0								5,000,000	5,000,000
156	Property Acquisition	1,000,000			0							1,000,000	0	1,000,000
157	AIP Matching	761,111			0							761,111	0	761,111
158	Perimeter Road Rehab	250,000			0							250,000	0	250,000
159	Taxiway C Extension	9,000,000			0							9,000,000	0	9,000,000
160	CCTV Upgrades/Expansion	100,000			0							100,000	0	100,000
161	Perimeter Communications Backbone	100,000			0							100,000	0	100,000
162	Spotted Road Improvement (non grant)	270,000			0							270,000	0	270,000
163	Parking Enhancements/Improvements	500,000			0							500,000	0	500,000
164	Misc Pavement Project	500,000			0							500,000	0	500,000
165	Fleet Vehicles	40,000			0							40,000	0	40,000
166	Utility Vehicles	25,000			0							25,000	0	25,000
167	VALE Program	1,000,000			0			900,000					100,000	1,000,000
168	Glycol Management	4,000,000	3,600,000	0	3,600,000								400,000	4,000,000
169	T/W Re-Configuration (mid term)	1,000,000	314,532	585,468	900,000								100,000	1,000,000
170	Replace Class 5 ARFF Vehicle	850,000	765,000	0	765,000								85,000	850,000
171	Master Plan-Felts	150,000	135,000	0	135,000								15,000	150,000
172	New Taxilanes-Felts	150,000	135,000	0	135,000								15,000	150,000
173	Terminal Construction Phase 1	15,000,000			0				11,000,000	4,000,000			0	15,000,000
174	Spotted Road Improvement (FHW grant)	1,750,000			0		1,400,000						350,000	1,750,000
	Other Capital-Felts	1,033,333			0								1,033,333	1,033,333
	Other Capital-BP	265,000			0								265,000	265,000
	Totals for 2017	$42,829,444	$4,949,532	$585,468	$5,535,000	$0	$1,400,000	$900,000	$11,000,000	$4,000,000	$0	$12,546,111	$7,448,333	$42,829,444

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding (ENP+Cargo)	AIP Discretionary Funding	Total AIP Funding	TSA Funding	State Grants	VALE Grants	Passenger Facility Charges (Debt)	Passenger Facility Charges (PAYG)	Private 3rd Party Funding	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
175	Aero Area Site Prep	1,000,000			0								1,000,000	1,000,000
176	Property Acquisition	1,000,000			0								1,000,000	1,000,000
177	AIP Matching	1,000,000			0								1,000,000	1,000,000
178	Fleet Vehicles	100,000			0								100,000	100,000
179	CCTV Upgrades/Expansion	100,000			0								100,000	100,000
180	Perimeter Communications Backbone	100,000			0								100,000	100,000
181	Spotted Road Improvement (non grant)	270,000			0								270,000	270,000
182	Parking Enhancements/Improvements	500,000			0								500,000	500,000
183	Misc Pavement Project	500,000			0								500,000	500,000
184	Customer Service Phones - Parking Lots	50,000			0								50,000	50,000
185	Replace Shuttle Buses	75,000			0								75,000	75,000
xx	Revenue Control System Upgrade	500,000			0								500,000	500,000
186	Fleet Vehicles	45,000			0								45,000	45,000
187	Police Vehicle Replacement	40,000			0								40,000	40,000
188	Fleet Vehicles	40,000			0								40,000	40,000
189	VALE Program	1,000,000			0			900,000					100,000	1,000,000
190	Glycol Management	3,000,000	2,700,000	0	2,700,000					182,817			117,183	3,000,000
191	T/W Re-Configuration (mid term)	5,000,000	977,612	3,522,388	4,500,000					500,000			0	5,000,000
192	New Taxilanes-Felts	1,500,000	1,350,000	0	1,350,000								150,000	1,500,000
193	Terminal Construction Phase 1	5,000,000			0				0	5,000,000			0	5,000,000
194	Spotted Road Improvement (FHW grant)	1,750,000			0		1,400,000						350,000	1,750,000
	Other Capital-Felts	1,216,667			0								1,216,667	1,216,667
	Other Capital-BP	310,000			0								310,000	310,000
	Totals for 2018	$24,096,667	$5,027,612	$3,522,388	$8,550,000	$0	$1,400,000	$900,000	$0	$5,682,817	$0	$0	$7,563,850	$24,096,667
	Total Short Term Project Costs Before Financing	$234,861,862	$24,387,429	$20,185,071	$44,572,500	$5,600,000	$5,696,000	$2,700,000	$44,500,000	$17,782,817	$0	$21,651,111	$92,359,434	$234,861,862
	Financing Costs for Debt Serviced with PFCs	8,692,282							8,692,282					8,692,282
	Total Short Term Projects	$243,554,144	$24,387,429	$20,185,071	$44,572,500	$5,600,000	$5,696,000	$2,700,000	$53,192,282	$17,782,817	$0	$21,651,111	$92,359,434	$243,554,144

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding (ENP+Cargo)	AIP Discretionary Funding	Total AIP Funding	TSA Funding	State Grants	VALE Grants	Passenger Facility Charges (Debt)	Passenger Facility Charges (PAYG)	Private 3rd Party Funding	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
Mid Term Projects (2019-2023)														
194	Taxiway Reconfiguration-Phase 3a (Construction)	$13,633,096	$12,269,786		$12,269,786					$1,363,310			$0	$13,633,096
195	Hayford Road Realignment	13,382,247			0								13,382,247	13,382,247
196	Equipment	4,089,929			0					4,089,929			0	4,089,929
197	Terminal Phase 2 (Construction)	36,354,922			0					14,675,004			21,679,918	36,354,922
198	Relocate and Expand US Customs	3,902,095			0								3,902,095	3,902,095
199	Property Acquisition	6,059,154			0								6,059,154	6,059,154
200	East Apron Phase 1 (Construction)	7,392,167	6,652,951		6,652,951								739,217	7,392,167
201	New Air Cargo Building	4,847,323			0						4,847,323		0	4,847,323
202	Construct Glycol Recovery System	5,453,238	4,907,914		4,907,914					545,324			0	5,453,238
203	Surface Lot Expansion Phase 1	2,713,289			0								2,713,289	2,713,289
204	Garage Assembly Area	4,373,497			0								4,373,497	4,373,497
205	Parking Lot Covered Walkway & Moving Sidewalks	17,012,892			0							17,012,892	0	17,012,892
206	Garage Pedestrian Bridge Expansion	12,154,662			0							12,154,662	0	12,154,662
207	Surface Lot Entrance Plaza	890,696			0								890,696	890,696
208	Parking Exit Plaza	1,053,081			0								1,053,081	1,053,081
209	Employee Surface Lot	1,021,573			0								1,021,573	1,021,573
210	Inbound Road W/O Flint	1,658,996			0					1,658,996			0	1,658,996
211	Concourse Road	4,137,190			0					4,137,190			0	4,137,190
212	Outbound Road	1,815,322			0					1,815,322			0	1,815,322
213	Runway 7-25 Overlay	6,059,154	2,728,467	2,724,771	5,453,238					605,915			0	6,059,154
214	Runway 7-25 Approach Upgrades	1,211,831		1,090,648	1,090,648					121,183			0	1,211,831
	Other Capital-SIA	22,721,826			0								22,721,826	22,721,826
	Other Capital-Felts	6,059,154			0								6,059,154	6,059,154
	Other Capital-BP	1,514,788			0								1,514,788	1,514,788
	Total Mid Term Project Costs Before Financing	$179,512,121	$26,559,118	$3,815,419	$30,374,537	$0	$0	$0	$0	$29,012,173	$4,847,323	$29,167,554	$86,110,534	$179,512,121
	Financing Costs for Debt Serviced with PFCs	9,975,348							9,975,348					9,975,348
	Total Mid Term Projects	$189,487,469	$26,559,118	$3,815,419	$30,374,537	$0	$0	$0	$9,975,348	$29,012,173	$4,847,323	$29,167,554	$86,110,534	$189,487,469

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Long Term Projects (2024-2033)														
215	Taxiway Reconfiguration	$34,033,269	$15,000,000	$15,629,942	$30,629,942					$3,403,327			$0	$34,033,269
216	Decommission Runway 7-25	3,403,327	3,062,994		3,062,994								340,333	3,403,327
217	Replace Class V ARFF Vehicle	5,104,990	4,594,491		4,594,491					510,499			0	5,104,990
218	Runway 3R-21L Extension (1,000' + Taxiways)	46,026,593	9,456,740		9,456,740								36,569,853	46,026,593
219	Terminal Phase 3 (Construction)	90,755,383			0					49,052,599			41,702,784	90,755,383
220	Property Acquisition	15,125,897			0								15,125,897	15,125,897
221	Deicing Apron Expansion	9,226,797	8,304,118		8,304,118					922,680			0	9,226,797
222	Parking Garage Expansion	75,629,486			0								75,629,486	75,629,486
223	Parking Garage Entrance Plaza	809,236			0								809,236	809,236
224	Garage Pedestrian Bridge Expansion	15,171,275			0								15,171,275	15,171,275
225	Surface Lot Expansion	3,386,688			0								3,386,688	3,386,688
226	Parking Area Circulation Road	1,798,469			0								1,798,469	1,798,469
227	Interchanges at Spotted Road	24,267,990			0								24,267,990	24,267,990
228	Inbound Road E/O Flint	3,775,424	3,397,882		3,397,882								377,542	3,775,424
229	Interchanges at Flint Road	931,755	838,580		838,580								93,176	931,755
230	East Industrial Park Roadway	4,831,212			0								4,831,212	4,831,212
231	Future Runway 3L-21R Planning	1,599,564			0								1,599,564	1,599,564
232	EA/EIS New Runway 3L-21R	6,806,654			0							6,806,654	0	6,806,654
233	Mitigation New Runway 3L-21R	17,016,634			0							17,016,634	0	17,016,634
234	New Runway 3L-21R (Design)	24,776,220			0							24,776,220	0	24,776,220
235	New Runway 3L-21R (Construction)	61,940,549			0							61,940,549	0	61,940,549
236	New Runway 3L-21R (Construction)	185,821,648			0							185,821,648	0	185,821,648
237	Electric Avenue Relocation	6,374,053			0								6,374,053	6,374,053
238	Replace/Relocate ATCT	39,705,480	15,729,578	20,005,355	35,734,932								3,970,548	39,705,480
	Other Capital-SIA	56,722,115			0								56,722,115	56,722,115
	Other Capital-Felts	15,125,897			0								15,125,897	15,125,897
	Other Capital-BP	3,781,474			0								3,781,474	3,781,474
	Total Long Term Project Costs Before Financing	$753,948,079	$60,384,382	$35,635,297	$96,019,678	$0	$0	$0	$0	$53,889,105	$0	$296,361,705	$307,677,592	$753,948,079
	Financing Costs for Debt Serviced with PFCs	23,676,036							23,676,036					23,676,036
	Total Long Term Projects	$777,624,116	$60,384,382	$35,635,297	$96,019,678	$0	$0	$0	$23,676,036	$53,889,105	$0	$296,361,705	$307,677,592	$777,624,116
Total Project Costs		$1,210,665,729	$111,330,929	$59,635,786	$170,966,715	$5,600,000	$5,696,000	$2,700,000	$86,843,666	$100,684,094	$4,847,323	$347,180,370	$486,147,561	$1,210,665,729

SPOKANE INTERNATIONAL AIRPORT (GEG)
Spokane, Washington

GEGMP2013_4.123 Table 8-3a

Master Plan - Financial Implementation Analysis
Debt Issue Serviced with PFCs

27-Dec-13

Debt Issue Structure

Issue Date:	01-Jan-15	
Interest:	5.0%	
Term:	30 Years	
Project Funding Requirement:	$44,500,000	
Debt Service Reserve Fund Requirement (MADS):	0	< no assump
Capitalized Interest:	0	< no assump
Capitalized Debt Issue Costs (2.5%):	0	< no assump
Total Debt Requirement:	$44,500,000	

Notes:
(1) Assumes no interest earnings on Construction Fund balance or Debt Service Reserve Fund deposit.
(2) Assumes DSRF funded from the issue amount

Debt Service Schedule

Payment Number	Year	Beginning Principal	Annual Debt Service	Interest Payment	Principal Payment	Ending Principal
1	2015	$44,500,000	$2,894,789	$2,225,000	$669,789	$43,830,211
2	2016	43,830,211	2,894,789	2,191,511	703,278	43,126,933
3	2017	43,126,933	2,894,789	2,156,347	738,442	42,388,491
4	2018	42,388,491	2,894,789	2,119,425	775,364	41,613,126
5	2019	41,613,126	2,894,789	2,080,656	814,133	40,798,994
6	2020	40,798,994	2,894,789	2,039,950	854,839	39,944,155
7	2021	39,944,155	2,894,789	1,997,208	897,581	39,046,573
8	2022	39,046,573	2,894,789	1,952,329	942,460	38,104,113
9	2023	38,104,113	2,894,789	1,905,206	989,583	37,114,530
10	2024	37,114,530	2,894,789	1,855,727	1,039,062	36,075,468
11	2025	36,075,468	2,894,789	1,803,773	1,091,015	34,984,452
12	2026	34,984,452	2,894,789	1,749,223	1,145,566	33,838,886
13	2027	33,838,886	2,894,789	1,691,944	1,202,845	32,636,041
14	2028	32,636,041	2,894,789	1,631,802	1,262,987	31,373,055
15	2029	31,373,055	2,894,789	1,568,653	1,326,136	30,046,918
16	2030	30,046,918	2,894,789	1,502,346	1,392,443	28,654,476
17	2031	28,654,476	2,894,789	1,432,724	1,462,065	27,192,410
18	2032	27,192,410	2,894,789	1,359,621	1,535,168	25,657,242
19	2033	25,657,242	2,894,789	1,282,862	1,611,927	24,045,315
20	2034	24,045,315	2,894,789	1,202,266	1,692,523	22,352,792
21	2035	22,352,792	2,894,789	1,117,640	1,777,149	20,575,643
22	2036	20,575,643	2,894,789	1,028,782	1,866,007	18,709,636
23	2037	18,709,636	2,894,789	935,482	1,959,307	16,750,329
24	2038	16,750,329	2,894,789	837,516	2,057,272	14,693,057
25	2039	14,693,057	2,894,789	734,653	2,160,136	12,532,921
26	2040	12,532,921	2,894,789	626,646	2,268,143	10,264,778
27	2041	10,264,778	2,894,789	513,239	2,381,550	7,883,228
28	2042	7,883,228	2,894,789	394,161	2,500,627	5,382,601
29	2043	5,382,601	2,894,789	269,130	2,625,659	2,756,942
30	2044	2,756,942	2,894,789	137,847	2,756,942	0
	Totals		$86,843,666	$42,343,666	$44,500,000	

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GEGMP2013_4.123 Table 8-3b

Master Plan - Financial Implementation Analysis
Hangar Development Debt Issue Serviced with Airport Cash

27-Dec-13

Debt Issue Structure

Issue Date:	01-Jul-14	
Interest:	5.0%	
Term:	30 Years	
Project Funding Requirement:	$24,000,000	
Debt Service Reserve Fund Requirement (MADS):	0	< no assump
Capitalized Interest:	0	< no assump
Capitalized Debt Issue Costs (2.5%):	0	< no assump
Total Debt Requirement:	$24,000,000	

Notes:
(1) Assumes no interest earnings on Construction Fund balance or Debt Service Reserve Fund deposit.
(2) Assumes DSRF funded from the issue amount

Debt Service Schedule

Payment Number	Year	Beginning Principal	Annual Debt Service	Interest Payment	Principal Payment	Ending Principal
1	2014	$24,000,000	$1,561,234	$1,200,000	$361,234	$23,638,766
2	2015	23,638,766	1,561,234	1,181,938	379,296	23,259,469
3	2016	23,259,469	1,561,234	1,162,973	398,261	22,861,208
4	2017	22,861,208	1,561,234	1,143,060	418,174	22,443,034
5	2018	22,443,034	1,561,234	1,122,152	439,083	22,003,952
6	2019	22,003,952	1,561,234	1,100,198	461,037	21,542,915
7	2020	21,542,915	1,561,234	1,077,146	484,089	21,058,826
8	2021	21,058,826	1,561,234	1,052,941	508,293	20,550,533
9	2022	20,550,533	1,561,234	1,027,527	533,708	20,016,825
10	2023	20,016,825	1,561,234	1,000,841	560,393	19,456,432
11	2024	19,456,432	1,561,234	972,822	588,413	18,868,019
12	2025	18,868,019	1,561,234	943,401	617,833	18,250,186
13	2026	18,250,186	1,561,234	912,509	648,725	17,601,461
14	2027	17,601,461	1,561,234	880,073	681,161	16,920,299
15	2028	16,920,299	1,561,234	846,015	715,219	16,205,080
16	2029	16,205,080	1,561,234	810,254	750,980	15,454,099
17	2030	15,454,099	1,561,234	772,705	788,529	14,665,570
18	2031	14,665,570	1,561,234	733,278	827,956	13,837,614
19	2032	13,837,614	1,561,234	691,881	869,354	12,968,260
20	2033	12,968,260	1,561,234	648,413	912,821	12,055,439
21	2034	12,055,439	1,561,234	602,772	958,463	11,096,976
22	2035	11,096,976	1,561,234	554,849	1,006,386	10,090,590
23	2036	10,090,590	1,561,234	504,530	1,056,705	9,033,885
24	2037	9,033,885	1,561,234	451,694	1,109,540	7,924,345
25	2038	7,924,345	1,561,234	396,217	1,165,017	6,759,328
26	2039	6,759,328	1,561,234	337,966	1,223,268	5,536,060
27	2040	5,536,060	1,561,234	276,803	1,284,431	4,251,629
28	2041	4,251,629	1,561,234	212,581	1,348,653	2,902,976
29	2042	2,902,976	1,561,234	145,149	1,416,086	1,486,890
30	2043	1,486,890	1,561,234	74,344	1,486,890	0
	Totals		$46,837,033	$22,837,033	$24,000,000	

SPOKANE INTERNATIONAL AIRPORT (GEG)
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Table 8-4

Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operations & Maintenance Expenses

27-Dec-13

Operations & Maintenance Expenses	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
AIRFIELD											
Payroll	$733,524	$777,825	$842,629	$867,908	$893,945	$920,763	$948,386	$976,838	$4,607,841	$5,341,750	$13,371,418
Payroll:Sia-P/R (In)	0	0	37,738	38,870	40,036	41,237	42,474	43,749	206,367	239,236	598,853
Payroll:Sia-P/R Out	0	0	(41,534)	(42,780)	(44,063)	(45,385)	(46,747)	(48,149)	(227,125)	(263,300)	(659,090)
Environmental	(131,642)	(250,017)	387,334	398,954	410,923	423,250	435,948	449,026	2,118,101	2,455,460	6,146,483
Power	122,217	146,343	147,057	151,469	156,013	160,693	165,514	170,479	804,168	932,251	2,333,602
Natural Gas	15,238	18,283	59,163	60,938	62,766	64,649	66,588	68,586	323,528	375,057	938,839
Refuse	16,404	8,351	22,601	23,279	23,977	24,697	25,438	26,201	123,592	143,276	358,648
Insurance	15,942	98,033	111,559	114,906	118,353	121,904	125,561	129,327	610,050	707,216	1,770,295
De-Icing	887,561	791,275	750,000	772,500	795,675	819,545	844,132	869,456	4,101,307	4,754,539	11,901,518
Bldg & Fixtures Maintenance	40,637	44,122	27,014	27,824	28,659	29,519	30,404	31,317	147,724	171,252	428,677
Grounds	381,799	462,250	401,254	413,292	425,690	438,461	451,615	465,163	2,194,221	2,543,704	6,367,375
Lighting	75,114	65,301	23,256	23,954	24,672	25,412	26,175	26,960	127,173	147,429	369,042
Equip Repair-Parts	87,374	142,233	159,186	163,962	168,880	173,947	179,165	184,540	870,494	1,009,141	2,526,073
Equipment Rental	50,347	52,024	35,710	36,781	37,885	39,021	40,192	41,398	195,277	226,379	566,671
Fuel & Oil	90,726	126,388	123,672	127,382	131,204	135,140	139,194	143,370	676,289	784,005	1,962,513
Supplies	38,506	45,947	65,940	67,918	69,956	72,054	74,216	76,443	360,587	418,019	1,046,381
Tools & Equipment	61,978	48,912	37,953	39,092	40,264	41,472	42,716	43,998	207,543	240,599	602,264
Personal Equipment	7,635	8,574	8,092	8,335	8,585	8,842	9,108	9,381	44,250	51,298	128,409
Maintenance/Contracts	2,439	6,868	11,095	11,428	11,771	12,124	12,488	12,862	60,672	70,335	176,063
Dues & Publications	533	5,200	643	662	682	703	724	745	3,516	4,076	10,204
Telephone	5,069	5,096	7,154	7,369	7,590	7,817	8,052	8,293	39,121	45,352	113,525
Janitorial	3,875	5,287	1,817	1,872	1,928	1,985	2,045	2,106	9,936	11,519	28,833
Medical	2,802	2,680	1,308	1,347	1,388	1,429	1,472	1,516	7,153	8,292	20,756
Postage	99	333	347	357	368	379	391	402	1,898	2,200	5,506
Office Supplies	2,354	3,253	3,845	3,960	4,079	4,202	4,328	4,457	21,026	24,375	61,015
Travel	4,610	8,525	9,258	9,536	9,822	10,116	10,420	10,733	50,627	58,690	146,912
Other Expenses	2,102	1,659	343	353	364	375	386	398	1,876	2,174	5,443
Contract Labor	0	0	820	845	870	896	923	951	4,484	5,198	13,012
Public Safety	198	18,821	2,762	2,845	2,930	3,018	3,109	3,202	15,104	17,509	43,829
FICA	59,637	62,425	62,837	64,722	66,664	68,664	70,724	72,845	343,618	398,348	997,141
Retirement	45,283	52,737	51,253	52,791	54,374	56,006	57,686	59,416	280,272	324,913	813,318
Medical	156,044	177,967	190,693	196,414	202,306	208,375	214,627	221,065	1,042,787	1,208,876	3,026,048
Ind Insurance	15,637	19,440	20,608	21,226	21,863	22,519	23,194	23,890	112,693	130,642	327,022
Life/Disablility	5,543	5,195	3,980	4,099	4,222	4,349	4,480	4,614	21,764	25,231	63,157
Emp Training / Licenses	4,666	11,151	19,660	20,250	20,857	21,483	22,128	22,791	107,509	124,632	311,978
Excise Tax	68,020	73,760	70,645	72,764	74,947	77,196	79,512	81,897	386,316	447,846	1,121,044
Water Service	24,286	19,106	1,898	1,955	2,014	2,074	2,136	2,200	10,379	12,032	30,119
Sewer	860	979	1,110	1,143	1,178	1,213	1,249	1,287	6,070	7,037	17,614
Total Airfield Expenses	$2,897,417	$3,066,326	$3,660,700	$3,770,521	$3,883,637	$4,000,146	$4,120,150	$4,243,755	$20,018,208	$23,206,590	$58,090,514

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Table 8-4

Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operations & Maintenance Expenses

27-Dec-13

Operations & Maintenance Expenses	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
TERMINAL BUILDING				Terminal Expansion Growth >		5.0%	5.0%	5.0%			
Payroll	$745,815	$771,057	$677,177	$697,492	$718,417	$776,968	$840,291	$908,775	$3,941,943	$5,177,188	$14,578,126
Payroll:Sia-P/R (In)	0	0	47,729	49,161	50,636	54,763	59,226	64,053	277,837	364,900	1,027,500
Payroll:Sia-P/R Out	0	0	(21,600)	(22,248)	(22,915)	(24,783)	(26,803)	(28,987)	(125,737)	(165,137)	(465,000)
Environmental	931	709	2,941	3,029	3,120	3,374	3,649	3,947	17,120	22,485	63,313
Power	686,000	692,748	663,529	683,435	703,938	761,309	823,356	890,459	3,862,496	5,072,845	14,284,315
Natural Gas	71,308	64,822	64,194	66,120	68,103	73,654	79,657	86,149	373,682	490,779	1,381,955
Refuse	54,771	54,779	49,224	50,701	52,222	56,478	61,081	66,059	286,540	376,330	1,059,684
Insurance	9,740	59,139	62,634	64,513	66,448	71,864	77,721	84,055	364,601	478,853	1,348,372
Bldg & Fixtures Maintenance	235,604	254,781	282,303	290,772	299,495	323,904	350,302	378,852	1,643,326	2,158,277	6,077,361
Grounds	5,996	13,961	9,115	9,388	9,670	10,458	11,311	12,232	53,060	69,686	196,226
Lighting Supplies	37,478	21,876	20,262	20,870	21,496	23,248	25,143	27,192	117,948	154,908	436,196
Equip Repair - Parts	89,964	68,610	129,512	133,397	137,399	148,597	160,708	173,806	753,908	990,152	2,788,108
Equipment Rental	35	213	242	249	257	278	300	325	1,409	1,850	5,210
Fuel & Oil	6,559	7,532	7,962	8,201	8,447	9,135	9,880	10,685	46,348	60,871	171,404
Supplies	30,908	51,320	31,510	32,455	33,429	36,153	39,100	42,287	183,424	240,902	678,341
Tools & Equipment	9,747	13,981	15,170	15,625	16,094	17,406	18,824	20,358	88,307	115,978	326,577
Personal Equipment	6,423	4,311	2,588	2,666	2,746	2,969	3,211	3,473	15,065	19,786	55,714
Maintenance Contracts	145,414	154,395	178,217	183,564	189,070	204,480	221,145	239,168	1,037,426	1,362,514	3,836,619
Dues & Publications	457	365	175	180	186	201	217	235	1,019	1,338	3,767
Telephone	4,253	4,532	4,435	4,568	4,705	5,089	5,503	5,952	25,817	33,907	95,476
Janitorial Services	879,670	924,874	945,233	973,590	1,002,798	1,084,526	1,172,915	1,268,507	5,502,335	7,226,543	20,348,781
Janitorial Products	158,923	160,400	145,821	150,196	154,701	167,310	180,945	195,692	848,845	1,114,838	3,139,204
Medical	0	65	0	0	0	0	0	0	0	0	0
Postage	21	63	68	70	72	78	84	91	396	520	1,464
Office Supplies	760	510	829	854	879	951	1,029	1,113	4,826	6,338	17,847
Travel	4,465	7	1,924	1,982	2,041	2,208	2,387	2,582	11,200	14,709	41,419
Other Expense	0	97	0	0	0	0	0	0	0	0	0
Public Safety	1,111	1,715	0	0	0	0	0	0	0	0	0
FICA	47,642	51,129	50,181	51,686	53,237	57,576	62,268	67,343	292,111	383,646	1,080,286
Retirement	40,202	49,361	46,162	47,547	48,973	52,965	57,281	61,950	268,716	352,920	993,766
Medical	134,152	151,383	137,676	141,806	146,060	157,964	170,838	184,762	801,431	1,052,567	2,963,860
Ind Insurance	11,615	15,196	15,712	16,183	16,669	18,027	19,497	21,086	91,462	120,122	338,245
Life/Disablility	5,264	5,268	3,866	3,982	4,101	4,436	4,797	5,188	22,505	29,557	83,226
Emp Training /Licenses	2,610	2,281	5,767	5,940	6,118	6,617	7,156	7,739	33,571	44,090	124,151
Excise Tax	144,453	134,114	0	0	0	0	0	0	0	0	0
Jetway Maintenance	44,641	26,291	17,024	17,535	18,061	19,533	21,125	22,846	99,099	130,153	366,489
Water	21,179	21,668	22,646	23,325	24,025	25,983	28,101	30,391	131,826	173,134	487,518
Sewer	20,332	21,554	21,043	21,674	22,325	24,144	26,112	28,240	122,494	160,879	453,009
Total Terminal Building Expenses	$3,658,443	$3,805,107	$3,641,271	$3,750,509	$3,863,024	$4,177,861	$4,518,357	$4,886,603	$21,196,354	$27,838,429	$78,388,529

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Table 8-4

Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operations & Maintenance Expenses

27-Dec-13

Operations & Maintenance Expenses	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
PARKING/LANDSIDE											
Payroll	$731,735	$763,500	$737,359	$759,480	$782,264	$805,732	$829,904	$854,801	$4,032,181	$4,674,403	$11,700,921
Power	55,244	52,375	47,004	48,414	49,867	51,363	52,903	54,491	257,037	297,976	745,892
Natural Gas	886	216	230	237	244	251	259	267	1,258	1,458	3,650
Insurance	10,006	60,217	59,764	61,557	63,404	65,306	67,265	69,283	326,814	378,867	948,376
De-Icing	0	519	2,600	2,678	2,758	2,841	2,926	3,014	14,218	16,482	41,259
Advertising	433	0	171	176	181	187	192	198	935	1,084	2,714
Bldgs & Fixtures	68,533	60,630	91,224	93,961	96,780	99,683	102,673	105,754	498,850	578,304	1,447,605
Grounds	128,165	167,752	125,496	129,261	133,139	137,133	141,247	145,484	686,264	795,568	1,991,457
Roadway Maintenance	8,114	209,474	74,303	76,532	78,828	81,193	83,629	86,138	406,319	471,035	1,179,091
Lighting Supplies	1,426	2,757	4,127	4,251	4,378	4,510	4,645	4,784	22,568	26,163	65,490
Equip Repair - Parts	37,638	72,685	39,436	40,619	41,838	43,093	44,386	45,717	215,652	250,000	625,798
Vehicle & Shuttle Repair	0	0	0	0	0	0	0	0	0	0	0
Equipment Rental	2,076	1,358	505	520	536	552	568	585	2,762	3,201	8,014
Fuel & Oil	71,725	71,142	59,932	61,730	63,582	65,489	67,454	69,478	327,733	379,932	951,042
Supplies	5,956	27,403	6,420	6,613	6,811	7,015	7,226	7,443	35,107	40,699	101,877
Tools & Equipment	5,412	6,335	2,510	2,585	2,663	2,743	2,825	2,910	13,726	15,912	39,830
Personal Equipment	3,400	3,328	3,381	3,482	3,587	3,695	3,805	3,920	18,489	21,433	53,652
Maintenance Contracts	51,386	66,012	81,325	83,765	86,278	88,866	91,532	94,278	444,718	515,551	1,290,521
Dues & Publications	1,510	1,535	1,020	1,051	1,082	1,115	1,148	1,182	5,578	6,466	16,186
Telephone	4,553	4,844	7,216	7,432	7,655	7,885	8,122	8,365	39,460	45,745	114,508
Janitorial	10,993	7,732	51,406	52,948	54,537	56,173	57,858	59,594	281,109	325,882	815,746
Medical	641	750	1,558	1,605	1,653	1,702	1,754	1,806	8,520	9,877	24,723
Postage	342	486	745	767	790	814	839	864	4,074	4,723	11,822
Office Supplies	4,715	6,633	7,381	7,602	7,831	8,065	8,307	8,557	40,362	46,791	117,127
Travel	3,021	6,643	4,675	4,815	4,960	5,108	5,262	5,420	25,565	29,637	74,186
Other Expense	19,812	3,417	5,314	5,473	5,638	5,807	5,981	6,160	29,059	33,687	84,326
Towing Fees	647	507	0	0	0	0	0	0	0	0	0
Credit Card Fees	194,536	191,682	175,984	181,264	186,701	192,302	198,072	204,014	962,353	1,115,630	2,792,636
Excise Taxes	39,615	39,174	37,083	38,195	39,341	40,522	41,737	42,989	202,785	235,083	588,459
FICA	54,918	58,783	56,408	58,100	59,843	61,639	63,488	65,392	308,462	357,592	895,121
Retirement	44,971	53,770	49,783	51,276	52,815	54,399	56,031	57,712	272,234	315,594	789,991
Medical	126,696	163,424	148,877	153,343	157,944	162,682	167,562	172,589	814,120	943,789	2,362,483
Ind Insurance	32,344	37,039	35,524	36,590	37,687	38,818	39,983	41,182	194,260	225,200	563,719
Life/Disablility	4,358	5,024	3,709	3,820	3,935	4,053	4,175	4,300	20,282	23,513	58,857
Emp Training / Licenses	3,387	3,446	3,291	3,390	3,491	3,596	3,704	3,815	17,997	20,863	52,224
Water	1,709	1,872	20,100	20,703	21,324	21,964	22,623	23,301	109,915	127,422	318,961
Sewer	660	801	791	815	839	864	890	917	4,326	5,014	12,552
Total Parking/Landside Expenses	$1,731,563	$2,153,265	$1,946,652	$2,005,052	$2,065,203	$2,127,159	$2,190,974	$2,256,703	$10,645,091	$12,340,578	$30,890,817

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Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operations & Maintenance Expenses

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Operations & Maintenance Expenses	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
HANGARS, BUILDINGS & LEASED SITES					New Hgr yr1	New Hgr yr2	New Hgr yr3	New Hgr yr4		New Hgr yr5-9	New Hgr yr10+
Environmental	$0	$18,799	$0	$0	$0	$0	$0	$0	$0	$0	$0
Engineering / Planning	0	0	0	0	0	0	0	0	0	0	0
New MRO Hangar Maintenance Expenses	0	0	0	0	20,000	20,600	21,218	21,855	83,673	345,695	996,733
Power	19,327	22,985	19,395	19,977	20,576	21,193	21,829	22,484	106,060	122,952	307,773
Natural Gas	19,879	22,474	9,238	9,515	9,801	10,095	10,397	10,709	50,517	58,563	146,595
Refuse	40,111	41,129	33,799	34,813	35,857	36,933	38,041	39,182	184,827	214,265	536,346
Insurance	3,612	21,531	11,038	11,369	11,710	12,062	12,423	12,796	60,360	69,974	175,159
Bldg & Fixtures Maintenance	140,996	175,492	41,118	42,352	43,622	44,931	46,279	47,667	224,850	260,663	652,489
Grounds	15,722	23	439	452	466	480	494	509	2,401	2,783	6,966
Lighting Supplies	11,138	354	31,379	32,320	33,290	34,289	35,317	36,377	171,593	198,924	497,944
Equip Repair - Parts	5,488	2,627	16,045	16,526	17,022	17,533	18,059	18,601	87,741	101,715	254,613
Supplies	3,741	196	125	129	133	137	141	145	684	792	1,984
Janitorial	1,947	4,276	93	96	99	102	105	108	509	590	1,476
Other Expense	98	101	158	163	168	173	178	183	864	1,002	2,507
Excise Tax	0	0	0	0	0	0	0	0	0	0	0
Water	4,765	7,491	6,049	6,230	6,417	6,610	6,808	7,012	33,078	38,347	95,990
Sewer	1,218	758	1,132	1,166	1,201	1,237	1,274	1,312	6,190	7,176	17,963
Total Hangars, Buildings & Leased Sites Expense	$268,042	$318,236	$170,008	$175,108	$200,361	$206,372	$212,564	$218,940	$1,013,346	$1,423,442	$3,694,538
OPERATIONS											
Payroll	$391,045	$327,389	$383,198	$394,694	$406,535	$418,731	$431,293	$444,232	$2,095,484	$2,429,240	$6,080,850
Payroll:Sia-P/R Out	0	0	(94,423)	(97,256)	(100,173)	(103,179)	(106,274)	(109,462)	(516,344)	(598,584)	(1,498,369)
Insurance	0	0	0	0	0	0	0	0	0	0	0
Equip Repair - Parts	3,193	5,958	2,764	2,847	2,932	3,020	3,111	3,204	15,115	17,522	43,861
Euqipment Rental	402	1,141	1,184	1,220	1,256	1,294	1,333	1,373	6,475	7,506	18,789
Fuel & Oil	10,838	11,958	10,807	11,131	11,465	11,809	12,163	12,528	59,097	68,510	171,493
Supplies	475	1,457	122	126	129	133	137	141	667	773	1,936
Tools & Equipment	2,140	2,396	5,987	6,167	6,352	6,542	6,738	6,941	32,739	37,954	95,006
Personal Equipment	1,223	1,638	755	778	801	825	850	875	4,129	4,786	11,981
Office Mach Maint	0	0	0	0	0	0	0	0	0	0	0
Dues & Publications	1,223	1,285	1,114	1,147	1,182	1,217	1,254	1,291	6,092	7,062	17,678
Telephone	5,266	6,546	6,857	7,063	7,275	7,493	7,718	7,949	37,497	43,469	108,812
Medical	0	469	346	356	367	378	389	401	1,892	2,193	5,491
Postage	99	130	142	146	151	155	160	165	777	900	2,253
Office Supplies	818	763	829	854	879	906	933	961	4,533	5,255	13,155
Travel	3,837	6,125	6,099	6,282	6,470	6,665	6,864	7,070	33,352	38,664	96,783
Other Expense	169	869	1,387	1,429	1,471	1,516	1,561	1,608	7,585	8,793	22,010
Public Safety	320	11,877	54,752	56,395	58,086	59,829	61,624	63,473	299,406	347,094	868,843
FICA	28,370	25,604	29,315	30,194	31,100	32,033	32,994	33,984	160,306	185,839	465,191
Retirement	23,076	23,944	26,135	26,919	27,727	28,558	29,415	30,298	142,917	165,680	414,728
Medical	94,678	76,068	102,531	105,607	108,775	112,038	115,400	118,862	560,682	649,984	1,627,033
Ind Insurance	5,335	5,981	8,319	8,569	8,826	9,090	9,363	9,644	45,492	52,737	132,012
Life/Disablility	6,130	5,320	4,672	4,812	4,957	5,105	5,258	5,416	25,548	29,618	74,139
Emp Training / Licenses	2,349	4,264	4,373	4,504	4,639	4,778	4,922	5,070	23,913	27,722	69,394
Total Operations Expenses	$580,986	$521,182	$557,265	$573,983	$591,202	$608,939	$627,207	$646,023	$3,047,353	$3,532,718	$8,843,066

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Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operations & Maintenance Expenses

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Operations & Maintenance Expenses	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
ENGINEERING											
Payroll	$207,888	$237,354	$242,513	$249,788	$257,282	$265,001	$272,951	$281,139	$1,326,160	$1,537,383	$3,848,364
Payroll:Sia-P/R Out	0	0	(105,270)	(108,428)	(111,681)	(115,031)	(118,482)	(122,037)	(575,660)	(667,347)	(1,670,497)
Legal & Audit	700	0	0	0	0	0	0	0	0	0	0
Environmental	15,375	17,710	13,290	13,689	14,099	14,522	14,958	15,407	72,675	84,250	210,895
Gen Arch / Eng / Planning	143,745	206,302	142,298	146,567	150,964	155,493	160,158	164,962	778,144	902,082	2,258,083
Insurance	1,037	7,966	7,747	7,979	8,219	8,465	8,719	8,981	42,364	49,111	122,935
Supplies	19,836	28,220	4,360	4,491	4,626	4,764	4,907	5,054	23,842	27,640	69,187
Telephone	0	0	0	0	0	0	0	0	0	0	0
Office Supplies	0	2,695	86	89	91	94	97	100	470	545	1,365
Travel	6,603	6,317	7,567	7,794	8,028	8,269	8,517	8,772	41,379	47,970	120,078
Other	9,736	22,319	15,070	15,522	15,988	16,467	16,961	17,470	82,409	95,535	239,141
FICA	15,754	17,704	18,552	19,109	19,682	20,272	20,880	21,507	101,450	117,608	294,396
Retirement	12,946	15,881	15,706	16,177	16,662	17,162	17,677	18,208	85,887	99,566	249,234
Medical	49,873	55,968	56,841	58,546	60,303	62,112	63,975	65,894	310,830	360,337	901,992
Ind Insurance	496	570	561	578	595	613	631	650	3,068	3,556	8,902
Life/Disablility	3,591	3,828	3,000	3,090	3,183	3,278	3,377	3,478	16,405	19,018	47,606
Emp Training / Licenses	10,815	2,634	3,439	3,542	3,648	3,758	3,871	3,987	18,806	21,801	54,572
Total Engineering Expenses	$498,395	$625,468	$425,760	$438,533	$451,689	$465,239	$479,197	$493,573	$2,328,230	$2,699,057	$6,756,253
ARFF											
Payroll	$1,512,211	$1,577,022	$1,339,040	$1,379,211	$1,420,588	$1,463,205	$1,507,101	$1,552,314	$7,322,420	$8,488,691	$21,248,811
Employer Def Comp	0	0	0	0	0	0	0	0	0	0	0
Power	21,340	21,345	21,322	21,962	22,621	23,299	23,998	24,718	116,597	135,168	338,352
Natural Gas	8,650	7,965	7,535	7,761	7,994	8,234	8,481	8,735	41,204	47,767	119,571
Refuse	478	260	241	248	256	263	271	279	1,318	1,528	3,824
Insurance	6,958	43,664	53,245	54,842	56,488	58,182	59,928	61,726	291,165	337,541	844,928
Bldgs & Fixtures	33,210	6,060	3,662	3,772	3,885	4,002	4,122	4,245	20,025	23,215	58,111
Equip Repair - Parts	20,090	6,490	9,521	9,807	10,101	10,404	10,716	11,037	52,065	60,357	151,086
Equipment Rental	402	1,141	1,185	1,221	1,257	1,295	1,334	1,374	6,480	7,512	18,804
Fuel & Oil	6,750	8,543	5,384	5,546	5,712	5,883	6,060	6,242	29,442	34,131	85,437
Supplies	3,894	4,315	7,507	7,732	7,964	8,203	8,449	8,703	41,051	47,590	119,126
Tools & Equipment	1,606	14,559	11,678	12,028	12,389	12,761	13,144	13,538	63,860	74,031	185,315
Personal Equipment	16,072	12,319	7,869	8,105	8,348	8,599	8,857	9,122	43,031	49,885	124,871
Maintenance/Contracts	2,434	1,535	7,585	7,813	8,047	8,288	8,537	8,793	41,478	48,084	120,364
Dues & Publications	1,718	1,789	812	836	861	887	914	941	4,440	5,148	12,885
Telephone	14,523	14,939	15,964	16,443	16,936	17,444	17,968	18,507	87,298	101,202	253,328
Janitorial	7,470	7,633	5,634	5,803	5,977	6,156	6,341	6,531	30,809	35,716	89,404
Medical	26,999	25,040	13,708	14,119	14,543	14,979	15,428	15,891	74,961	86,900	217,528
Postage	22	10	0	0	0	0	0	0	0	0	0
Office Supplies	0	0	0	0	0	0	0	0	0	0	0
Travel	388	333	1,860	1,916	1,973	2,032	2,093	2,156	10,171	11,791	29,516
Other Expense	5,996	10,491	3,210	3,306	3,405	3,508	3,613	3,721	17,554	20,349	50,938
Fica	17,223	14,415	13,879	14,295	14,724	15,166	15,621	16,090	75,896	87,984	220,242
Retirement	65,612	64,258	61,053	62,885	64,771	66,714	68,716	70,777	333,863	387,039	968,831
Medical	1,169,157	563,843	322,975	332,664	342,644	352,924	363,511	374,417	1,766,160	2,047,463	5,125,190
Ind Insurance	19,012	23,626	22,171	22,836	23,521	24,227	24,954	25,702	121,240	140,551	351,825
Life/Disablility	11,587	8,829	10,474	10,788	11,112	11,445	11,789	12,142	57,276	66,399	166,209
Employer Def Comp	40,284	41,523	39,077	40,249	41,457	42,700	43,982	45,301	213,689	247,724	620,101
Emp Training / Licenses	15,707	16,600	24,020	24,741	25,483	26,247	27,035	27,846	131,351	152,272	381,166
Water	1,345	1,734	1,548	1,594	1,642	1,692	1,742	1,795	8,465	9,813	24,565
Sewer	764	799	810	834	859	885	912	939	4,429	5,135	12,854
Total ARFF Expenses	$3,031,902	$2,501,080	$2,012,969	$2,073,358	$2,135,559	$2,199,626	$2,265,614	$2,333,583	$11,007,740	$12,760,987	$31,943,181

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Operations & Maintenance Expenses	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
POLICE											
Payroll	$1,062,855	$973,122	$917,600	$945,128	$973,482	$1,002,686	$1,032,767	$1,063,750	$5,017,813	$5,817,020	$14,561,110
Gov'T Grants	(424,686)	(449,447)	(280,000)	(288,400)	(297,052)	(305,964)	(315,142)	(324,597)	(1,531,155)	(1,775,028)	(4,443,233)
Insurance	4,069	25,066	26,260	27,048	27,859	28,695	29,556	30,443	143,600	166,472	416,712
Equip Repair - Parts	6,477	23,285	4,227	4,354	4,484	4,619	4,758	4,900	23,115	26,797	67,077
Equipment Rental	266	787	252	260	267	275	284	292	1,378	1,598	3,999
Fuel & Oil	20,748	18,977	15,881	16,357	16,848	17,354	17,874	18,410	86,844	100,676	252,011
Supplies	11,213	15,760	15,156	15,611	16,079	16,561	17,058	17,570	82,879	96,080	240,506
Equipment	44,810	39,865	33,585	34,593	35,630	36,699	37,800	38,934	183,657	212,908	532,950
Personal Equipment	12,428	22,409	3,875	3,991	4,111	4,234	4,361	4,492	21,190	24,565	61,491
Maintenance Contracts	1,697	3,342	3,021	3,112	3,205	3,301	3,400	3,502	16,520	19,151	47,939
Dues & Publications	2,896	2,088	2,894	2,981	3,070	3,162	3,257	3,355	15,826	18,346	45,924
Telephone	8,640	11,727	11,684	12,035	12,396	12,767	13,150	13,545	63,893	74,069	185,410
Medical	44	486	867	893	920	947	976	1,005	4,741	5,496	13,758
Postage	145	81	10	10	11	11	11	12	55	63	159
Office Supplies	7,860	6,330	8,199	8,445	8,698	8,959	9,228	9,505	44,835	51,977	130,107
Travel	3,547	3,401	14,180	14,605	15,044	15,495	15,960	16,439	77,542	89,892	225,018
Other Expense	630	1,131	450	464	477	492	506	522	2,461	2,853	7,141
Contract Labor	146,046	143,833	109,026	112,297	115,666	119,136	122,710	126,391	596,199	691,158	1,730,100
Public Safety	20,000	20,000	17,143	17,657	18,187	18,733	19,295	19,873	93,745	108,676	272,037
FICA	79,333	74,671	68,480	70,534	72,650	74,830	77,075	79,387	374,477	434,121	1,086,688
Retirement	55,903	52,982	46,215	47,601	49,029	50,500	52,015	53,576	252,723	292,975	733,372
Medical	147,065	143,148	139,261	143,439	147,742	152,174	156,739	161,442	761,536	882,829	2,209,890
Industrial Ins	15,700	17,816	16,709	17,210	17,727	18,258	18,806	19,370	91,372	105,925	265,150
Life/Disability Ins	7,793	7,166	4,824	4,969	5,118	5,271	5,429	5,592	26,380	30,581	76,551
Emp Training / Licenses	5,286	8,334	3,845	3,960	4,079	4,202	4,328	4,457	21,026	24,375	61,015
Total Police Expenses	$1,240,765	$1,166,360	$1,183,644	$1,219,153	$1,255,728	$1,293,400	$1,332,202	$1,372,168	$6,472,651	$7,503,576	$18,782,880
INFORMATION TECHNOLOGY											
Payroll	$122,739	$117,918	$145,495	$149,860	$154,356	$158,986	$163,756	$168,669	$795,626	$922,349	$2,308,815
Insurance	627	3,768	3,801	3,915	4,032	4,153	4,278	4,406	20,785	24,096	60,317
Equip Repair	1,188	5,166	3,385	3,487	3,591	3,699	3,810	3,924	18,511	21,459	53,716
Supplies	9,535	25,683	20,020	20,621	21,239	21,876	22,533	23,209	109,478	126,915	317,691
Tools & Equip	8,975	1,163	853	879	905	932	960	989	4,665	5,407	13,536
Maintenance Contracts	31,715	21,646	56,987	58,697	60,458	62,271	64,139	66,064	311,628	361,263	904,309
Telephone	1,528	4,450	5,906	6,083	6,266	6,454	6,647	6,847	32,296	37,440	93,720
Postage	102	43	411	423	436	449	463	476	2,248	2,605	6,522
Office Supplies	250	683	1,188	1,224	1,260	1,298	1,337	1,377	6,496	7,531	18,852
Travel	1,569	1,988	850	876	902	929	957	985	4,648	5,388	13,488
Other	0	160	190	196	202	208	214	220	1,039	1,204	3,015
FICA	9,055	9,362	11,130	11,464	11,808	12,162	12,527	12,903	60,863	70,557	176,619
Retirement	7,416	8,706	9,805	10,099	10,402	10,714	11,036	11,367	53,618	62,158	155,593
Medical	36,902	41,184	54,445	56,078	57,761	59,494	61,278	63,117	297,728	345,148	863,971
Ind Insurance	333	346	385	397	408	421	433	446	2,105	2,441	6,109
Life/Disablility	2,089	2,110	1,889	1,946	2,004	2,064	2,126	2,190	10,330	11,975	29,976
Emp Training/Licenses	232	646	3,750	3,863	3,978	4,098	4,221	4,347	20,507	23,773	59,508
Total Information Technology Expenses	$234,255	$245,022	$320,490	$330,105	$340,008	$350,208	$360,714	$371,536	$1,752,571	$2,031,710	$5,085,756

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Table 8-4

Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operations & Maintenance Expenses

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Operations & Maintenance Expenses	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
COMMUNICATIONS											
Dispatcher Payroll	$243,535	$273,516	$253,130	$260,724	$268,546	$276,602	$284,900	$293,447	$1,384,219	$1,604,689	$4,016,842
Equip Repair	840	141	2,836	2,921	3,009	3,099	3,192	3,288	15,508	17,978	45,004
Supplies	1,163	0	0	0	0	0	0	0	0	0	0
Equipment	35	4,202	5,796	5,970	6,149	6,333	6,523	6,719	31,695	36,743	91,975
Personal/Uniforms	3,030	846	896	923	951	979	1,008	1,039	4,900	5,680	14,218
Telephones	3,838	4,379	5,797	5,971	6,150	6,335	6,525	6,720	31,700	36,749	91,991
Postage	0	0	0	0	0	0	0	0	0	0	0
Office Supplies	506	209	0	0	0	0	0	0	0	0	0
Other	206	870	0	0	0	0	0	0	0	0	0
Emp Training / Licenses	332	0	0	0	0	0	0	0	0	0	0
Travel	0	0	0	0	0	0	0	0	0	0	0
FICA	18,087	20,095	19,365	19,946	20,544	21,161	21,795	22,449	105,896	122,762	307,297
Retirement	14,900	18,816	17,300	17,819	18,354	18,904	19,471	20,055	94,603	109,671	274,528
Medical	80,999	82,710	73,164	75,359	77,620	79,948	82,347	84,817	400,091	463,815	1,161,017
Industrial Ins	1,239	1,280	1,341	1,381	1,423	1,465	1,509	1,555	7,333	8,501	21,280
Life/Disability Ins	3,468	3,931	2,768	2,851	2,937	3,025	3,115	3,209	15,137	17,547	43,925
Total Communications Expenses	$372,178	$410,995	$382,393	$393,865	$405,681	$417,851	$430,387	$443,298	$2,091,082	$2,424,137	$6,068,076
GENERAL ADMINISTRATION											
Payroll	$931,619	$875,953	$981,323	$1,010,763	$1,041,086	$1,072,318	$1,104,488	$1,137,622	$5,366,276	$6,220,985	$15,572,311
	0	0	(97,693)	(100,624)	(103,643)	(106,752)	(109,954)	(113,253)	(534,225)	(619,314)	(1,550,260)
Legal & Audit	307,172	301,173	299,433	308,416	317,668	327,199	337,014	347,125	1,637,422	1,898,221	4,751,609
	0	0	361,710	372,561	383,738	395,250	407,108	419,321	1,977,979	2,293,019	5,739,864
Marketing	154,523	307,970	240,834	248,059	255,501	263,166	271,061	279,193	1,316,979	1,526,740	3,821,720
	0	0	268,296	276,345	284,635	293,174	301,970	311,029	1,467,152	1,700,832	4,257,506
	0	0	181,544	186,990	192,600	198,378	204,329	210,459	992,757	1,150,877	2,880,865
Environmental	939	21,393	82	84	87	90	92	95	448	520	1,301
Research / Planning	223,123	191,745	81,165	83,600	86,108	88,691	91,352	94,092	443,843	514,536	1,287,982
General Engineering / Arch	37,201	36,809	23,922	24,640	25,379	26,140	26,924	27,732	130,815	151,651	379,611
Insurance Claims Expense	25,737	15,763	9,871	10,167	10,472	10,786	11,110	11,443	53,979	62,576	156,640
Liability Insurance	148,807	78,735	74,260	76,488	78,782	81,146	83,580	86,088	406,084	470,763	1,178,409
Fire Insurance	143,871	0	0	0	0	0	0	0	0	0	0
Equip Insurance	56,566	0	0	0	0	0	0	0	0	0	0
Employment Ads	6,994	14,206	14,952	15,401	15,863	16,338	16,829	17,333	81,764	94,786	237,269
Equip Repair - Parts	2,473	6,064	1,515	1,560	1,607	1,655	1,705	1,756	8,285	9,604	24,041
Equipment Rental	8,786	6,543	6,305	6,494	6,689	6,890	7,096	7,309	34,478	39,970	100,052
Fuel & Oil	1,041	1,578	1,052	1,084	1,116	1,150	1,184	1,220	5,753	6,669	16,694
Supplies	17,674	15,543	789	813	837	862	888	915	4,315	5,002	12,520
Office Equipment	22,042	17,522	41,835	43,090	44,383	45,714	47,086	48,498	228,771	265,208	663,867
Office Equip Maint & Service	7,067	12,990	16,578	17,075	17,588	18,115	18,659	19,218	90,655	105,094	263,071
Dues & Publications	121,820	111,125	187,756	193,389	199,190	205,166	211,321	217,661	1,026,727	1,190,258	2,979,442
Telephone	26,428	27,806	31,291	32,230	33,197	34,193	35,218	36,275	171,112	198,366	496,547
Medical	22	3,710	206	212	219	225	232	239	1,126	1,306	3,269
Postage	8,722	6,904	7,470	7,694	7,925	8,163	8,408	8,660	40,849	47,355	118,539
Office Supplies	26,204	37,152	30,202	31,108	32,041	33,003	33,993	35,012	165,157	191,462	479,266
Travel	89,172	57,759	87,349	89,969	92,669	95,449	98,312	101,261	477,660	553,739	1,386,114
Other Expense	11,040	50,605	6,021	6,202	6,388	6,579	6,777	6,980	32,925	38,169	95,545
Contract Labor	93,533	67,992	38,569	39,726	40,918	42,145	43,410	44,712	210,911	244,504	612,040
Excise Tax	1,258	2,246	9,213	9,489	9,774	10,067	10,369	10,680	50,380	58,405	146,198
FICA	64,616	59,749	75,071	77,323	79,643	82,032	84,493	87,028	410,519	475,904	1,191,278
Retirement	51,978	59,215	66,096	68,079	70,121	72,225	74,392	76,623	361,440	419,008	1,048,857
Medical Expense	326,603	365,871	387,898	399,535	411,521	423,867	436,583	449,680	2,121,185	2,459,035	6,155,433
Industrial Ins	959	2,211	2,177	2,242	2,310	2,379	2,450	2,524	11,905	13,801	34,546
Life/Disability Ins	14,875	14,344	10,940	11,268	11,606	11,954	12,313	12,682	59,824	69,353	173,603
Unemployment Compensation	50,941	62,472	3,496	3,601	3,709	3,820	3,935	4,053	19,118	22,162	55,477
Emp Education/Licenses	13,105	32,808	45,241	46,598	47,996	49,436	50,919	52,447	247,396	286,800	717,915
Total General Administration Expenses	$2,996,911	$2,865,956	$3,496,769	$3,601,672	$3,709,722	$3,821,014	$3,935,644	$4,053,714	$19,121,766	$22,167,368	$55,489,143

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Table 8-4

Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operations & Maintenance Expenses

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Operations & Maintenance Expenses	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
FUEL FACILITY											
Payroll	$135,856	$116,547	$119,729	$123,321	$127,020	$130,831	$134,756	$138,799	$654,727	$759,008	$1,899,942
Admin Payroll:Fufac-P/R (In)	0	0	11,717	12,069	12,431	12,803	13,188	13,583	64,073	74,279	185,933
Environmental	1,612	812	2,792	2,876	2,962	3,051	3,142	3,237	15,268	17,700	44,305
Power	23,009	24,368	23,054	23,746	24,458	25,192	25,947	26,726	126,069	146,148	365,837
Bldg & Fixtures	486	0	6,349	6,539	6,736	6,938	7,146	7,360	34,719	40,249	100,750
Grounds	0	0	0	0	0	0	0	0	0	0	0
Lighting	101	0	2,810	2,894	2,981	3,071	3,163	3,258	15,366	17,814	44,591
Equip Repair	17,321	17,871	28,062	28,904	29,771	30,664	31,584	32,532	153,455	177,896	445,307
Equip Rental	146	146	146	150	155	160	164	169	798	926	2,317
Fuel & Oil	2,262	1,944	2,667	2,747	2,829	2,914	3,002	3,092	14,584	16,907	42,322
Supplies	7,025	11,215	7,702	7,933	8,171	8,416	8,669	8,929	42,118	48,826	122,221
Tools & Equipment	1,794	3,206	3,555	3,662	3,771	3,885	4,001	4,121	19,440	22,537	56,413
Personal Equipment	4,155	3,560	4,065	4,187	4,313	4,442	4,575	4,712	22,229	25,770	64,506
Maintenance Contracts	5,684	5,157	7,285	7,504	7,729	7,961	8,199	8,445	39,837	46,182	115,603
Dues & Publications	47	0	0	0	0	0	0	0	0	0	0
Telephone	4,538	5,017	5,497	5,662	5,832	6,007	6,187	6,373	30,060	34,848	87,230
Janitorial	1,816	864	1,082	1,114	1,148	1,182	1,218	1,254	5,917	6,859	17,170
Medical	0	101	235	242	249	257	264	272	1,285	1,490	3,729
Postage	23	14	0	0	0	0	0	0	0	0	0
Office Supplies	1,211	1,307	1,775	1,828	1,883	1,940	1,998	2,058	9,706	11,252	28,167
Travel	0	1,573	0	0	0	0	0	0	0	0	0
Other Expenses	261	276	478	492	507	522	538	554	2,614	3,030	7,585
Excise Tax	13,660	11,584	9,010	9,280	9,559	9,845	10,141	10,445	49,270	57,118	142,977
Employee Licenses/Education	0	1,444	0	0	0	0	0	0	0	0	0
Water	1,064	1,152	1,209	1,245	1,283	1,321	1,361	1,402	6,611	7,664	19,185
Sewer	576	674	634	653	673	693	714	735	3,467	4,019	10,061
Management Fee	0	0	0	0	0	0	0	0	0	0	0
Liability Insurance	1,728	10,329	10,129	10,433	10,746	11,068	11,400	11,742	55,390	64,212	160,734
Fica Exp Fuel Facility	9,812	8,663	9,159	9,434	9,717	10,008	10,309	10,618	50,085	58,062	145,341
Retirement-Fuel Facility	8,018	8,095	8,141	8,385	8,637	8,896	9,163	9,438	44,518	51,609	129,187
Medical Expense-Fuel Fac.	77,201	60,649	62,109	63,972	65,891	67,868	69,904	72,001	339,637	393,733	985,588
Industrial Ins - Fuel Fac.	3,403	4,675	5,055	5,207	5,363	5,524	5,689	5,860	27,643	32,046	80,216
Life/Disability Ins-Fuel Fac	2,115	1,595	1,255	1,293	1,331	1,371	1,413	1,455	6,863	7,956	19,915
Total Fuel Facility Expenses	324,924	302,838	335,701	345,772	356,145	366,830	377,834	389,169	1,835,751	2,128,138	5,327,135
Total Operations & Maintenance Expenses	$17,835,781	$17,981,835	$18,133,622	$18,677,631	$19,257,960	$20,034,644	$20,850,843	$21,709,064	$100,530,142	$120,056,728	$309,359,888
Annual Growth Rate	-	0.8%	0.8%	3.0%	3.1%	4.0%	4.1%	4.1%	3.7%	3.5%	3.4%
Operating Expenses Per Enplaned Passenger:									AVG	AVG	AVG
Spokane International Airport	$11.63	$11.96	$11.58	$11.44	$11.32	$11.30	$11.29	$11.28	$11.33	$11.05	$10.79
Small-Hub Industry Average	$31.23	$32.17	$33.13	$34.13	$35.15	$36.20	$37.29	$38.41	$36.24	$42.01	$52.58

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Table 8-5

Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operating Revenues

27-Dec-13

Revenues	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
				ENP		LDW					
AIRLINE REVENUES											
Landing Fees - Sig Pax	$2,968,999	$2,872,614	$2,581,425	$2,658,868	$2,738,634	$2,880,097	$3,028,868	$3,185,323	$14,491,789	$18,539,013	$53,478,500
Landing Fees - Sig NonPax	383,903	648,619	811,585	835,933	861,011	886,841	913,446	940,849	4,438,079	5,144,950	12,878,791
Landing Fees - NonSig Pax	211,262	251,819	117,553	121,080	124,712	131,154	137,929	145,053	659,927	844,230	2,435,305
Landing Fees - NonSig NonPax	401,759	158,254	170,710	175,831	181,106	186,539	192,136	197,900	933,512	1,082,197	2,708,944
RON Parking - Sig Pax	32,225	52,740	55,543	57,209	58,926	61,969	65,170	68,537	311,811	398,893	1,150,665
RON Parking - NonSig	40,432	40,768	37,632	38,761	39,924	41,122	42,355	43,626	205,787	238,564	597,171
Field Use	11,569	13,729	14,537	14,973	15,422	15,885	16,362	16,852	79,494	92,156	230,683
Terminal Rent	4,217,073	4,330,990	4,431,746	4,564,698	4,701,639	4,842,689	4,987,969	5,137,608	24,234,604	28,094,548	70,326,004
Jetway Rental	131,040	131,040	131,040	134,971	139,020	143,191	147,487	151,911	716,580	830,713	2,079,433
Ground Services	66,947	64,808	72,864	75,050	77,301	79,620	82,009	84,469	398,450	461,913	1,156,256
Total Airline Revenues	$8,465,209	$8,565,381	$8,424,635	$8,677,374	$8,937,695	$9,269,107	$9,613,730	$9,972,129	$46,470,035	$55,727,176	$147,041,753
Annual Growth Rate	-	1.2%	-1.6%	3.0%	3.0%	3.7%	3.7%	3.7%	3.4%	3.7%	3.7%
Airline Cost Per Enplaned Passenger:									AVG	AVG	AVG
Spokane International Airport	$5.52	$5.70	$5.38	$5.32	$5.25	$5.23	$5.20	$5.18	$5.23	$5.13	$5.13
Small-Hub Industry Average	$7.90	$8.14	$8.39	$8.64	$8.90	$9.16	$9.44	$9.72	$9.17	$10.63	$13.31
NON-AIRLINE REVENUES											
Parking/Landside											
Parking Revenues	$8,410,865	$8,317,095	$8,388,072	$9,002,996	$9,663,000	$10,371,389	$11,131,709	$11,947,768	$52,116,863	$73,972,584	$245,736,147
Hangars & Buildings					New Hgr yr1	New Hgr yr2	New Hgr yr3	New Hgr yr4		New Hgr yr5-9	New Hgr yr10+
FBO Rent	159,668	128,767	123,218	126,915	130,722	134,644	138,683	142,843	673,807	781,126	1,955,308
Cargo Building Rent	154,165	159,292	193,750	199,563	205,549	211,716	218,067	224,609	1,059,504	1,228,256	3,074,559
Other Building Rent	73,431	82,511	86,838	89,443	92,126	94,890	97,737	100,669	474,866	550,500	1,378,005
New MRO Hangar Rent	0	0	0	0	1,108,915	1,108,915	1,108,915	1,108,915	4,435,660	5,793,623	11,711,770
Commercial Operators	403,449	430,317	460,746	474,568	488,805	503,470	518,574	534,131	2,519,548	2,920,847	7,311,435
Leased land											
FBO Rent	44,998	35,819	32,332	33,302	34,301	35,330	36,390	37,482	176,805	204,965	513,066
Commercial Operators	244,470	240,380	250,727	258,249	265,996	273,976	282,195	290,661	1,371,078	1,589,455	3,978,709
Motel	278,337	282,706	281,349	289,789	298,483	307,438	316,661	326,161	1,538,532	1,783,580	4,464,640
Rental Car Service Areas	282,450	351,202	548,660	565,120	582,073	599,536	617,522	636,047	3,000,298	3,478,167	8,706,515
Other Land	51,966	46,203	43,443	44,746	46,089	47,471	48,895	50,362	237,564	275,402	689,384
Local Government	31,521	0	0	0	0	0	0	0	0	0	0
Federal Government	304,712	120,318	122,837	126,522	130,318	134,227	138,254	142,402	671,723	778,711	1,949,262
Terminal											
Trip Fees	39,420	36,667	38,306	41,114	44,128	47,363	50,835	54,562	238,003	337,812	1,122,209
Food & Liquor Concessions	837,722	850,324	848,748	910,969	977,752	1,049,430	1,126,363	1,208,936	5,273,451	7,484,924	24,864,839
Store Tenants Concessions	269,626	248,148	257,596	276,480	296,749	318,503	341,853	366,914	1,600,498	2,271,683	7,546,508
Office Tenants	313,907	310,197	311,496	320,841	330,466	340,380	350,591	361,109	1,703,388	1,974,693	4,943,033
Car Rental Concessions	4,045,423	3,827,151	3,619,467	3,884,808	4,169,601	4,475,272	4,803,351	5,155,482	22,488,513	31,919,293	106,035,556
Vending Machine Concessions	33,130	27,501	26,733	28,693	30,796	33,054	35,477	38,078	166,098	235,753	783,167
Audit Findings	0	85,000	0	0	0	0	0	0	0	0	0
GTC Rent	140,813	156,995	209,535	215,821	222,296	228,965	235,833	242,908	1,145,823	1,328,323	3,325,046
Other Rentals	7,261	7,164	7,164	7,379	7,600	7,828	8,063	8,305	39,176	45,415	113,683
Advertising Concessions	212,180	214,468	151,453	155,997	160,676	165,497	170,462	175,576	828,207	960,119	2,403,361
Telephone Commissions	22,017	115	242	249	257	264	272	281	1,323	1,534	3,840
Other	9,192	10,055	10,074	10,376	10,688	11,008	11,338	11,679	55,089	63,863	159,861

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Table 8-5

Master Plan - Financial Implementation Analysis
Actual, Estimated and Projected Operating Revenues

27-Dec-13

Revenues	Actual 2011	Actual 2012	Estimated 2013	Short Term Projected 2014	2015	2016	2017	2018	Total	Mid Term 2019-2023	Long Term 2024-2033
				ENP		LDW					
Other											
Parking Infractions	20,698	12,524	10,132	10,436	10,749	11,072	11,404	11,746	55,406	64,231	160,782
Telephone Cost Recovery	3,015	3,015	2,782	2,865	2,951	3,040	3,131	3,225	15,213	17,636	44,147
Other Government Agency	0	0	0	0	0	0	0	0	0	0	0
Audit Interest	572	0	0	0	0	0	0	0	0	0	0
Force Account Recovery	28,339	13,380	6,202	6,388	6,580	6,777	6,980	7,190	33,915	39,317	98,418
Recovery Account	31,435	44,650	4,826	4,971	5,120	5,274	5,432	5,595	26,391	30,594	76,582
A/R-Finance Charges	8,567	418	(84)	(87)	(89)	(92)	(95)	(97)	(459)	(533)	(1,333)
Other	53,595	9,054	47,824	49,259	50,736	52,259	53,826	55,441	261,521	303,175	758,904
Fuel Facility											
Fuel Flowage Fees - Pax	581,718	598,623	481,000	495,430	510,293	536,652	564,373	593,525	2,700,272	3,454,396	9,964,713
Fuel Flowage Fees - GA	196,146	43,388	57,899	59,636	61,425	63,268	65,166	67,121	316,615	367,044	918,781
Fuel Flowage Fees - NonPax	0	0	130,000	133,900	137,917	142,055	146,316	150,706	710,893	824,120	2,062,930
Total Non-Airline Revenues	$17,294,808	$16,693,447	$16,753,367	$17,826,739	$20,083,070	$21,320,869	$22,644,576	$24,060,330	$105,935,584	$145,080,609	$456,853,828
Annual Growth Rate	-	-3.5%	0.4%	6.4%	12.7%	6.2%	6.2%	6.3%	7.5%	6.2%	6.1%
NON-OPERATING REVENUES											
Operational Interest	$413,391	$470,029	$272,299	$280,468	$288,882	$297,548	$306,475	$315,669	$1,489,043	$1,726,208	$4,321,028
Salvage Sales & Other	8,344	9,001	7,332	7,552	7,779	8,012	8,252	8,500	40,094	46,480	116,349
Security Reimbursement	471,899	420,000	0	0	0	0	0	0	0	0	0
Total Non-Operating Revenues	$893,634	$899,030	$279,631	$288,020	$296,661	$305,560	$314,727	$324,169	$1,529,137	$1,772,689	$4,437,378
Annual Growth Rate	-	0.6%	-68.9%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Total Revenues	$26,653,651	$26,157,858	$25,457,633	$26,792,133	$29,317,426	$30,895,536	$32,573,033	$34,356,628	$153,934,756	$202,580,474	$608,332,959
Annual Growth Rate	-	-1.9%	-2.7%	5.2%	9.4%	5.4%	5.4%	5.5%	6.2%	5.5%	5.5%
Operating Revenues Per Enplaned Passenger:									AVG	AVG	AVG
Spokane International Airport	$16.80	$16.80	$16.07	$16.24	$17.06	$17.26	$17.46	$17.68	$17.17	$18.47	$21.06
Small-Hub Industry Average	$27.10	$27.92	$28.75	$29.62	$30.50	$31.42	$32.36	$33.33	$31.45	$36.46	$45.63

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Table 8-6

Master Plan - Financial Implementation Analysis
Financial Plan Summary
Projected Net Revenues, Capital Funding and Capital Expenditures

27-Dec-13

Operating/Capital Cash Flow	Short Term						Mid Term	Long Term
	Projected							
	2014	2015	2016	2017	2018	Total	2019-2023	2024-2033
Operating Cash Flow								
Revenues:								
Airline Revenues	$8,677,374	$8,937,695	$9,269,107	$9,613,730	$9,972,129	$46,470,035	$55,727,176	$147,041,753
Non-Airline Revenues	17,826,739	20,083,070	21,320,869	22,644,576	24,060,330	105,935,584	145,080,609	456,853,828
Non-Operating Revenues	288,020	296,661	305,560	314,727	324,169	1,529,137	1,772,689	4,437,378
Total Revenues	$26,792,133	$29,317,426	$30,895,536	$32,573,033	$34,356,628	$153,934,756	$202,580,474	$608,332,959
Operations & Maintenance Expenses	($18,677,631)	($19,257,960)	($20,034,644)	($20,850,843)	($21,709,064)	($100,530,142)	($120,056,728)	($309,359,888)
Operating Net Cash Flow Before Existing Debt Service	8,114,502	10,059,466	10,860,892	11,722,189	12,647,564	53,404,614	82,523,746	298,973,070
Less Existing Debt Service:								
Revenue Bonds - Series 2008	(2,220,388)	(2,224,138)	(2,221,538)	(2,226,138)	(2,222,538)	(11,114,740)	(2,225,738)	0
Revenue Bonds - Series 2010	(1,048,075)	(1,058,475)	(1,055,750)			(3,162,300)		
CERB Loans	(108,100)	(108,100)	(467,520)	(467,520)	(467,519)	(1,618,759)	(2,337,597)	(3,272,032)
Total Existing Debt Service	(3,376,563)	(3,390,713)	(3,744,808)	(2,693,658)	(2,690,057)	(15,895,799)	(4,563,335)	(3,272,032)
Total Airport Operating Funds Available For Capital Expenditures	$4,737,939	$6,668,753	$7,116,084	$9,028,531	$9,957,507	$37,508,815	$77,960,411	$295,701,038
Capital Cash Flow								
Beginning Cash Balance	$29,687,415	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$29,687,415	$5,100,363	$6,214,060
Other Capital Funding Sources:								
AIP Entitlement Grants (Pax)	$4,533,273	$4,596,483	$4,662,350	$4,730,987	$4,802,510	$23,325,602	$25,195,192	$56,979,516
AIP Entitlement Grants (Cargo)	200,000	206,000	212,180	218,545	225,102	1,061,827	1,363,926	3,404,866
AIP Discretionary Grants	11,039,227	4,242,517	795,470	585,468	3,522,388	20,185,071	3,815,419	35,635,297
TSA Funding	200,000	5,400,000	0	0	0	5,600,000	0	0
State Grants	596,000	900,000	1,400,000	1,400,000	1,400,000	5,696,000	0	0
VALE Grants	0	0	900,000	900,000	900,000	2,700,000	0	0
Passenger Facility Charges	6,529,695	6,804,255	7,090,360	7,388,495	7,699,166	35,511,972	43,486,117	114,679,671
Less PFCs for Projects not on CIP	(3,150,000)	(3,000,000)	0	0	0	(6,150,000)	0	0
New MRO Hangar Debt Proceeds (30 yrs, 5.0%) Thru 2043	24,000,000	0	0	0	0	24,000,000	0	0
Less Debt Service Payments	(780,617)	(1,561,234)	(1,561,234)	(1,561,234)	(1,561,234)	(7,025,555)	(7,806,172)	(32,005,306)
PFC Debt Proceeds (30 yrs, 5.0%) Thru 2044	0	44,500,000	0	0	0	44,500,000	0	0
Less Principal Payments	0	(669,789)	(703,278)	(738,442)	(775,364)	(2,886,874)	(4,498,596)	(37,114,530)
RAC CFC Funding	2,503,067	2,578,159	2,655,504	2,735,169	2,817,224	13,289,123	17,069,993	42,613,040
Private 3rd Party Funding	0	0	0	0	0	0	4,847,323	0
Other Unidentified Funding	0	0	9,105,000	12,546,111	0	21,651,111	29,167,554	296,361,705
Total Other Capital Funding Sources	$45,670,645	$63,996,391	$24,556,351	$28,205,098	$19,029,791	$181,458,277	$112,640,756	$480,554,258
Total Funds Available for Capital Expenditures	$80,095,999	$88,638,170	$66,673,939	$47,314,947	$31,316,455	$248,654,507	$195,701,530	$782,469,356
Capital Improvement Program Expenditures	62,122,973	53,636,667	56,592,622	44,985,791	26,216,092	243,554,144	189,487,469	777,624,116
Ending Cash Balance	$17,973,026	$35,001,503	$10,081,317	$2,329,156	$5,100,363	$5,100,363	$6,214,060	$4,845,241

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